R&D: Pueblo will help. But when?

September 10, 1973

RAILWAY AGE

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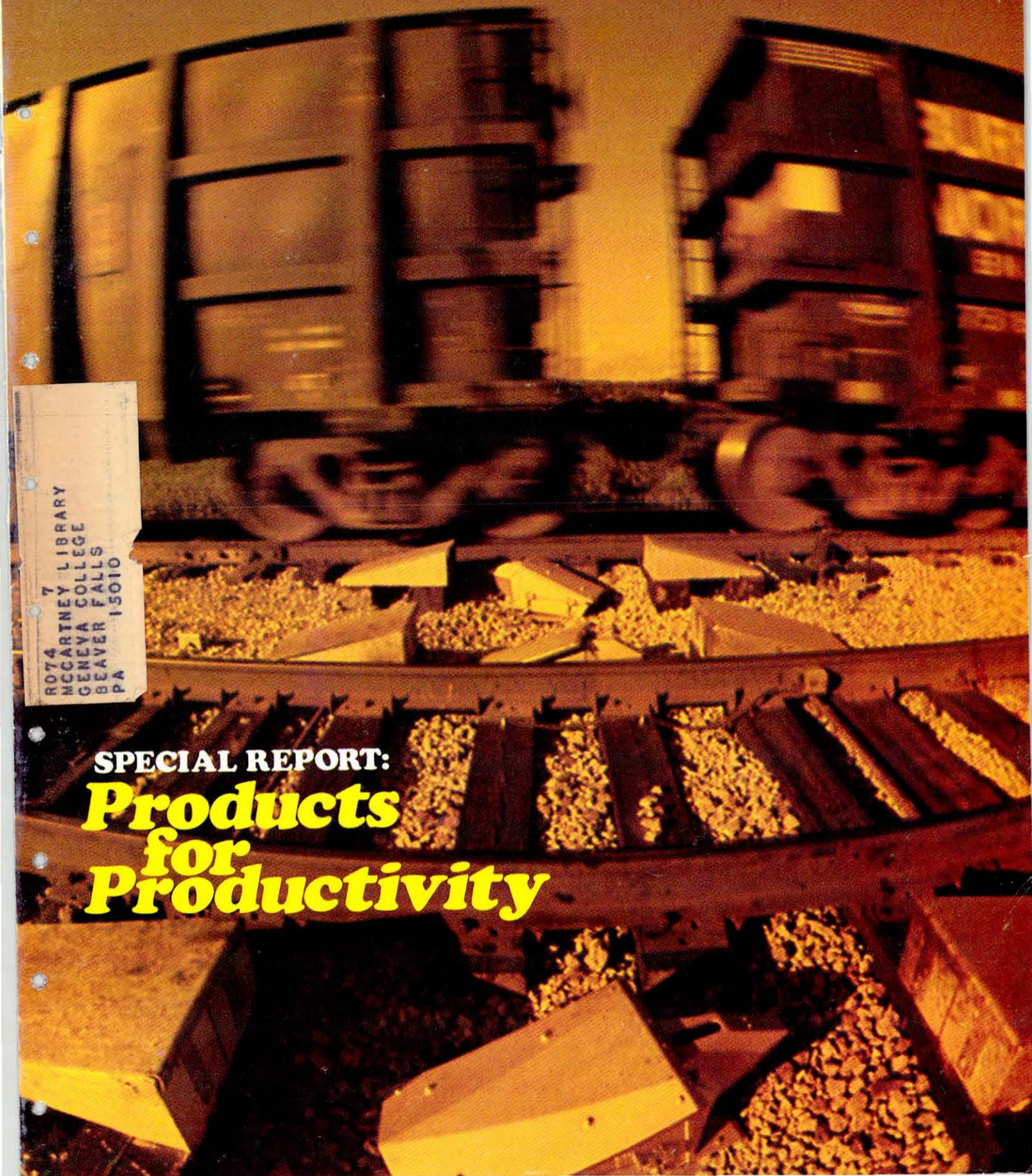

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SPECIAL REPORT:

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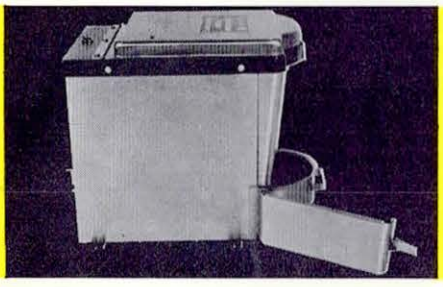

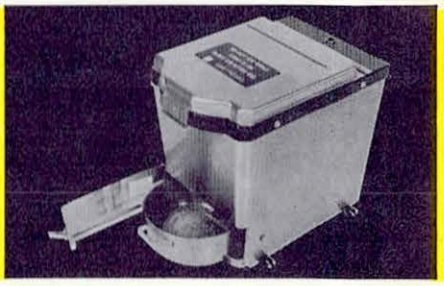

— And that's the way it should be. Purchase of Research Products' new electric-incinerating toilet for locomotives is the most economical way to go because MODEL S uses the electric power of the locomotive to operate (no fuel tanks, no water, no pipes, no chemicals, no costly honey-wagon attendance), and because its servicing is minimal. Servicing of Research Products' Model S is the most simple, most economical of any retention toilet because (1) its human waste is incinerated to odorless, bacteria-free ASH, and because (2) that ASH can be emptied from the front of its removable ASH drawer. When you're making a check list on toilets, remember only Model S uses throughout heavy-gauge stainless steels and nickels, has CANDOR odor catalyst, incorporates a COVER/LID, gives you venting by either blower or ejector principle.

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Circle 4 on coupon page 57

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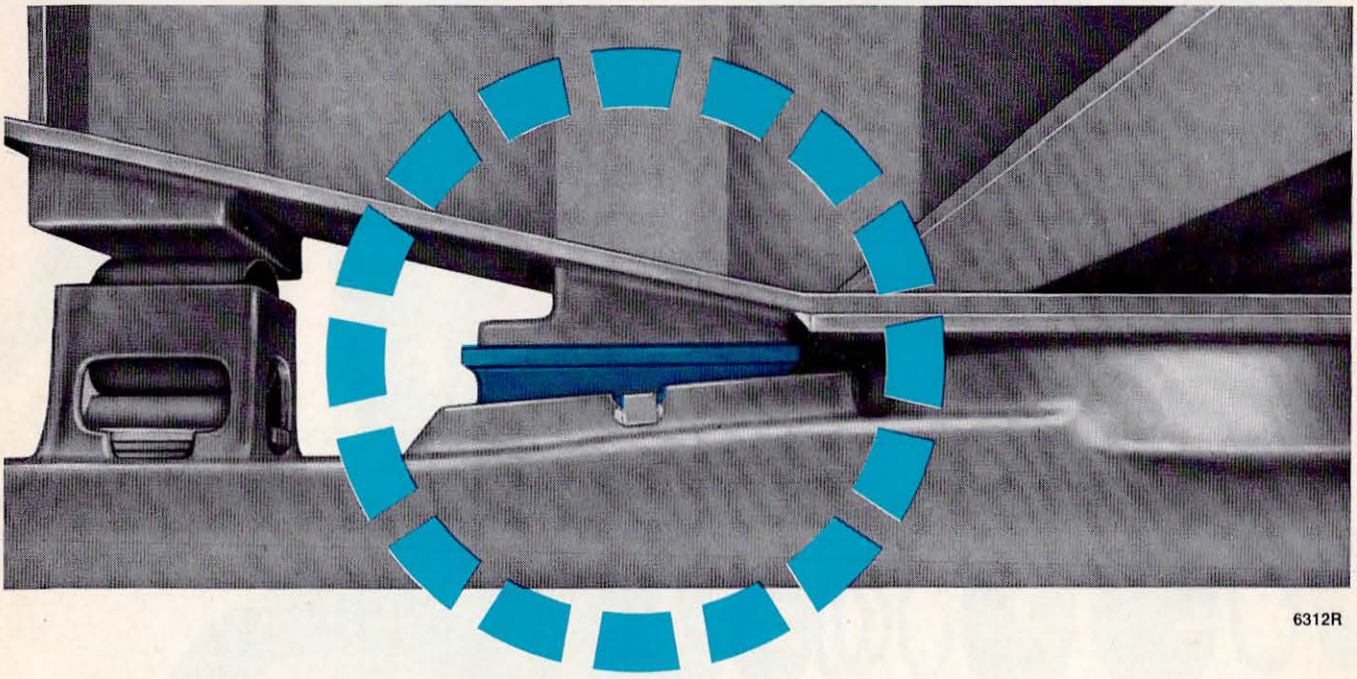

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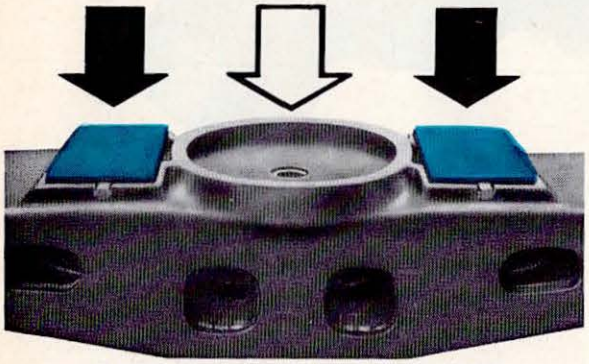
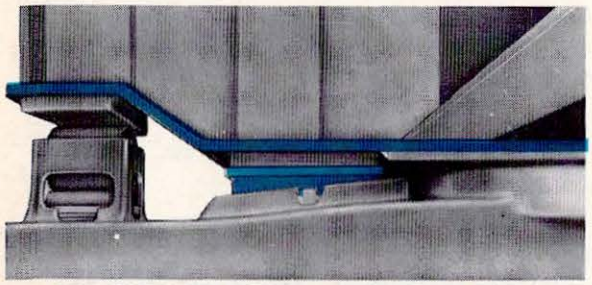


C-PEP REDISTRIBUTES THE LOAD



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RAILWAY AGE

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Inside

LUTHER MILLER

PROBLEMS/SOLUTIONS

Is there anything that the railroads need, in the way of operating or other hardware, that they are not presently getting from their suppliers? The answer has to be yes. There is, for example, an urgent—and unfilled—need for a fully automatic coupler (including air hose connection). And there are other glaring gaps on the hardware shelf, notably in the areas of automation and electrification. But even a cursory examination suggests that the barriers to closing these gaps are not so much technological as they are institutional, historical and financial.

Given the too-limited area in which it can effectively innovate, the railway supply/support industry has done, we submit, a rather remarkable job for its customers—and it is the intent of this issue's cover story to describe and document this accomplishment.

"Products for Productivity," a staff survey coordinated by Senior Editor Gus Welty and including major contributions, in narrative and photos, from Engineering Editor Merwin Dick, C&S Editor Robert W. McKnight and Mechanical Editor Fred N. Houser, starts on p. 23.

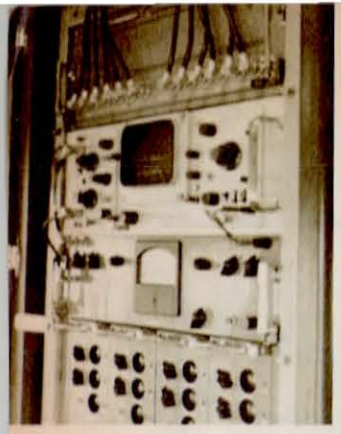
This is the seventh installment in our 1973 series of special reports which have the broad theme, "Profit through Productivity." Earlier articles in this series covered run-through trains (Feb. 26); loss and damage reduction (March 26); freight-car utilization (April 30); maintenance-of-way (May 28); employees (July 30); terminal operations (Aug. 27). Still to come: unit trains (Sept. 24); TOFC/COFC (Oct. 29); budget-planning (Nov. 26); marketing and market development (Dec. 31).

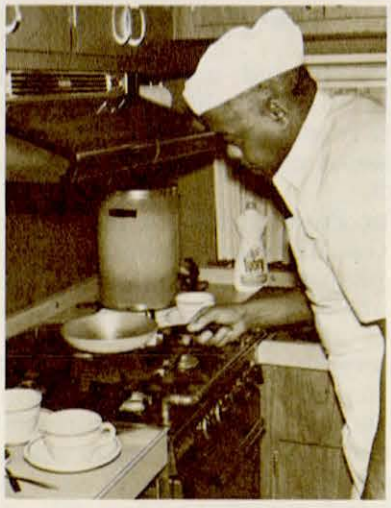
IS THERE A FORD (PRT) IN YOUR FUTURE?

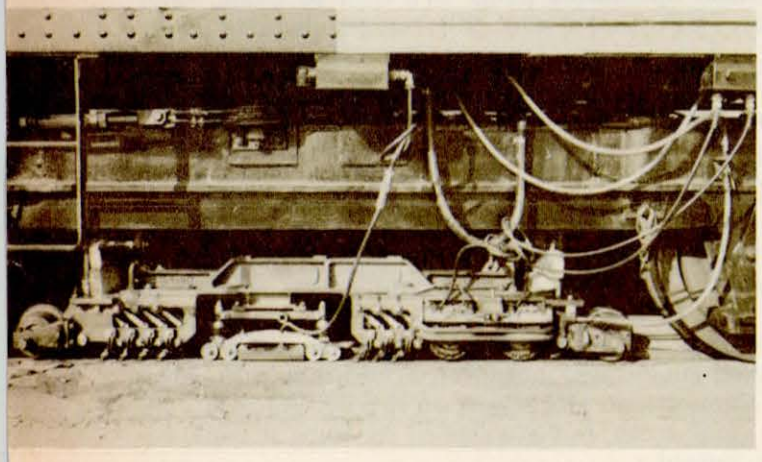
A Dearborn, Mich., firm which over the years has zealously promoted the notion that there is a Ford in your future now has a better idea. The vehicle of the future will still be a Ford, hopes Ford, but not necessarily or exclusively the internal combustion variety that requires $6-billion-a-year worth of superhighways to keep it rolling. Ford is now sold on the idea of driverless, electric-powered personal rapid transit vehicles operating on fixed guideways; moreover, Ford has sold the idea to the State of Connecticut. Our report on this development, on p. 94, makes a small story; but as a sign of the time, it could be a very big story, indeed.

Ford's commitment to rapid transit appears to be a substantial one. The company unveiled its prototype version of ACT (Automatically Controlled Transportation) at Transpo '72 in Washington last year. It is building an ACT system in the Fairlane Town Center under development in Dearborn, plus a new ACT research and test facility near Ypsilanti, Mich.

With first the aerospace companies, and now the automobile companies, scrambling aboard the rapid-transit bandwagon, who can any longer doubt where the future lies?







It takes more than a simple scope and a couple of test probes to make a rail detector car

At Sperry Rail Service, our detector car technology is a forward moving force as it was when we first started looking for rail defects. Last year we added two new cars to the fleet and completely modernized three others . . . from the test carriage to the instrument consoles, from the galley to the crew's quarters. Further refinement of induction and ultrasonic test equipment provides even greater detection accuracy.

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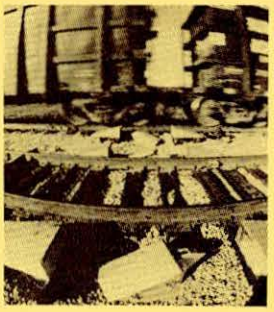
RAILWAY AGE

SEPTEMBER 10, 1973

FEATURES



COVER
Wallace W. Abbey, a former Railway Age western editor who now heads his own public relations counseling firm, Abbey Enterprises, shot this issue's cover picture on the Burlington Northern's mainline south of St. Paul.

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Short and Significant

CARBUILDERS' BACKLOG AT 7-YEAR HIGH

Although the backlog of undelivered new freight cars in all the nation's assembly facilities went up less than 2% during July, this was enough to push the commercial carbuilders' backlog to 43,189 on Aug. 1, 1973, the highest in almost seven years. Carbuilders got orders for 5,382 new cars during July and 300 more are to be built in railroad shops. While both of these figures were down from June 1973, they were substantially ahead of the July 1972 figures.

C&NW FILES STOCK-OFFERING PLAN

Employee-owned Chicago & North Western is asking ICC approval for a plan designed to broaden employee ownership and to facilitate buying and selling of stock between employees. North Western has already gone to the Commission with proposals covering a 60-for-1 split and issuance of up to 500,000 new, post-split shares (RA, Aug. 27, p. 8). The stock-offering circular proposes that offers to buy be matched against selling applications, that new shares (up to 500,000) be issued if the buys exceed the sells, and that selling applications be honored on a pro-rata basis if shares offered for sale exceed those subscribed for. C&NW's plan also would set up a payroll-deduction plan and would continue the compensation-based formula used in the original offering to determine how much stock an employee may buy.

EVANS TO ACQUIRE MONON TRAILER

Evans Products Co., which manufactures and leases rail cars through its subsidiary, U.S. Railway Equipment Co., has announced that an agreement has been signed which will enable it to enter the truck-trailer manufacture, sale and leasing business. The agreement involves acquisition of Monon Trailer Inc., headquartered in Monon, Ind. Terms of the transaction were not announced. The Monon operation would continue under existing management as part of Evans' industrial products group.

NEW PC TRAILER KINGPIN CUTS DOWNTIME

Two thousand new highway trailer vans are being put into service in Penn Central's TrailVan services. The 40-foot vans, costing more than $11 million, are being acquired by Pennsylvania Truck Lines, Inc., and provided to PC. PTL is a wholly-owned highway transport subsidiary. The vans, built by Fruehauf, will go into service as they are delivered at the rate of 200 units a month. They will have a completely new type of kingpin which eliminates the need to shop a trailer when it has worn or been damaged. "Replacement costs about $600," says Denver Eyler, PTL president, "and places the trailer out of service for an extensive period of time. The new-type kingpin can be replaced at a cost of only $60 to $75, and the work can be done in the railroad piggyback yard, so that no productive times is lost for the equipment."

WHAT $40 MILLION BUYS IN A YARD

Burlington Northern, which will invest $40 million in its new Northern Yard at Minneapolis, says, "Analysts have asked what $40 million buys in a classification yard today." BN's answer: Trackwork, $8,852,000; grading, bridges and culverts, $8,090,000; yard signals, interlockers and retarders, $7,231,000; hump tower and support buildings, $1,378,000; car repair shop and related facilities, $1,651,000; locomotive repair shop and related facilities, $4,447,000; pollution control including noise abatement, $770,000; relocation of powerlines and waterlines, $1,490,000; utilities, $927,000; computer control systems, $2,340,000; communication systems, $610,000; engineering, $991,000; miscellaneous and contingency, $1,223,000.

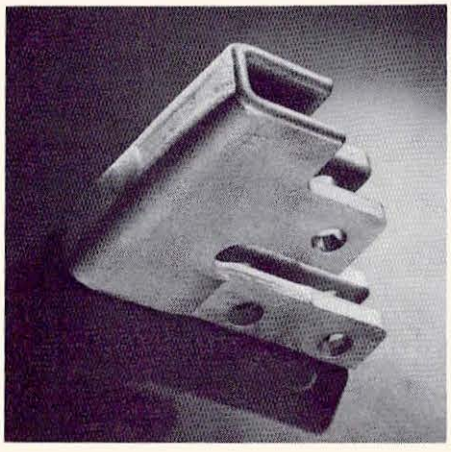
ENVIRONMENTAL SESSIONS SCHEDULED

Pollution hazards in transportation will be among the ecology-related topics that will be explored at the Second International Pollution Engineering Congress and Exposition to be held at Philadelphia's Civic Center Oct. 22-25. The theme of the sessions—"Engineering for Economical Controls"—will emphasize the need for industry and governmental agencies to seek out economically-feasible methods for controlling pollution. Details are available from Clapp & Poliak, Inc., 245 Park Ave., New York 10017.

MACHINE TOOL BACKLOG MOVES UP

Net new orders and shipments of machine tools dropped during July as the industry entered the normally slow mid-summer months, says the National Machine Tool Builders' Association. New orders, a key indicator of the state of the economy, continued to exceed shipments, adding $81.8 million to the order backlog. Net new orders in July totaled $188,100,000, an 80% increase over July 1972 orders, but a decrease of 11% compared with June 1973. Machine tool orders for the first seven months of 1973 were 114% ahead of the comparable 1972 period. July shipments totaled $106,250,000, a 47% increase over July 1972 but 27% below June 1973. The backlog at the end of July was $1,633,400,000.

Let's get down to facts



Buffalo Brake Beams feature

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Who else does it?

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MEMBER RPI

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RAILWAY AGE
NEWS

UP/RI: "Grand design" plan gets a big "no"

Union Pacific still wants Rock Island. But under the terms and conditions set out in an ICC administrative law judge's recommendations? No way. As UP puts it, a merger of RI and UP "cannot and will not proceed on the basis of Judge [Nathan] Klitenic's report."

UP's objections fall under four main headings:

—The original proposal "involved a relatively simple merger." But the Klitenic report "goes far beyond this proposal and in effect proposes a 'grand design' to restructure the entire western and midwestern railroad complex." This plan "wholly distorts the [Interstate Commerce] Commission's jurisdiction and responsibilities and reflects the law judge's overstepping his authority." The plan in general and several of the conditions "are utterly unworkable and unacceptable to UP."

—A major condition in the report involves post-merger sale by UP to Southern Pacific of RI lines south and southwest of Kansas City. But, SP's contractual obligation to buy "has terminated and conditioning the merger on this sale would give SP a veto over the merger. This veto power is virtually a delegation of the Commission's ultimate authority to approve or disapprove the merger." If, post-merger, SP should decline to make the purchase, "UP should be allowed to retain the entire Rock Island."

—The report proposes that the ICC retain jurisdiction for an indeterminate period, to take on petitions for inclusion from railroads desiring to file them. Thus, UP "would have no way of assessing prior to the merger the likelihood of someday being saddled with one or more financially distressed carriers. Without specific limitations, this would be an intolerable risk that no prudent management and board of directors could reasonable accept."

—The report uses the RI merger "as a vehicle to require Union Pacific Corp., the non-carrier parent of Union Pacific Railroad, to submit to full Commission regulation." The corporation has substantial assets and operations aside from the railroad, and "there is no legal or logical justification for submitting these non-transportation operations to Commission regulation or to imposing upon Union Pacific Corp. a second tier of regulation which merely duplicates the Commission's regulation" of the railroad.

UP urges rejection of the "grand design" theory. It urges that the ICC deal only with the issues actually arising from the application before it. It urges that conditions be realistically evaluated. It urges prompt consideration: "Continued delay or the imposition of unacceptable conditions could well lead to the bankruptcy of the Rock Island and prevent realization of the many benefits resulting from merger of RI into a strong, viable system."

Earlier, UP had told RI that a re-evaluation of the agreed-upon merger exchange ratio would be needed, in view of the time lapse—something like 10 years—since RI proceedings began and in view of the "substantial physical and financial deterioration" of RI in the meantime. Now, UP is also proposing that the ICC set the case for oral argument "immediately following the filing of replies on Oct. 19, to provide an opportunity for clarification of any questions which then remain."

UP was not the only western road finding fault with the recommendations. Among the group filing statements in opposition to one extent or another were Southern Pacific, which called the administrative law judge's plan "completely impractical," Santa Fe, Chicago & North Western, Frisco, Missouri Pacific, and Western Pacific.

FIRST BART TRAIN through the tube arrives at San Francisco's Montgomery Street station.

BART makes trans-bay test run

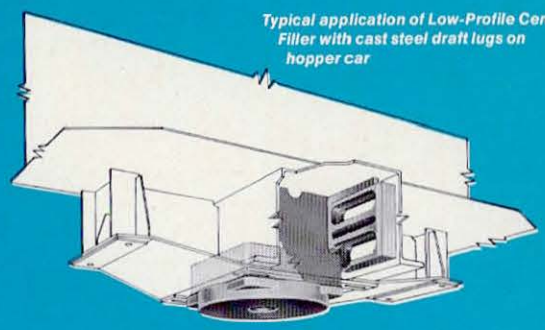
Originally scheduled to start Sept. 24, Bay Area Rapid Transit's trans-bay service won't begin until early in 1974, says BART General Manager B.R. Stokes. But a successful test run was made through the tube in mid-August. BART directors and newsmen were aboard for the 70-mph ride over a 6.21-mile segment between Oakland West Station and San Francisco's Montgomery Street Station. The run was under full automatic control and the Westinghouse Electric equipment worked perfectly.

Said Stokes: "It's a great day. The tube is the keystone of the BART system. It is the element to link together the downtowns of Oakland and San Francisco into a single entity. It makes BART truly regional."

PROBLEM: CRITICAL INTERFACE BETWEEN TRUCK AND CAR BODY

DRESSER HAS THE SOLUTION

FOR RIGID UNDERFRAME CARS

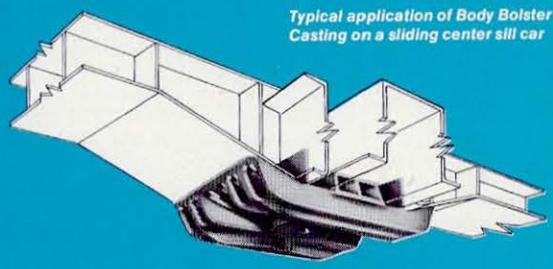


Typical application of Low-Profile Center Filler with cast steel draft lugs on hopper car

LOW-PROFILE CENTER FILLER (PATENTED)

Tested and proved in laboratory and actual road service, Dresser's Low-Profile Center Filler is a new concept in design engineering. It is devised to combine the structural advantages of a cast center filler with integral bowl with economic advantages of fabrications. There are over 15,000 carsets sold or on order to date, with up to 3-1/2 years of trouble-free service recorded on 100 and 125-ton cars—a true mark of dependability.

FOR CUSHION UNDERFRAME CARS



Typical application of Body Bolster Center Support Casting on a sliding center sill car

BODY BOLSTER CENTER SUPPORT CASTINGS

The effectiveness, superiority and value of Dresser's Body Bolster Center Support Castings has been proved for over 10 years now, with over 50,000 carsets applied on cushion underframe cars of all types. They were devised to provide the extra support needed for the overhang of 60 foot or longer cars, and are essential to the structural stability of cars with steel decks. Current castings are designed to meet all AAR specifications.

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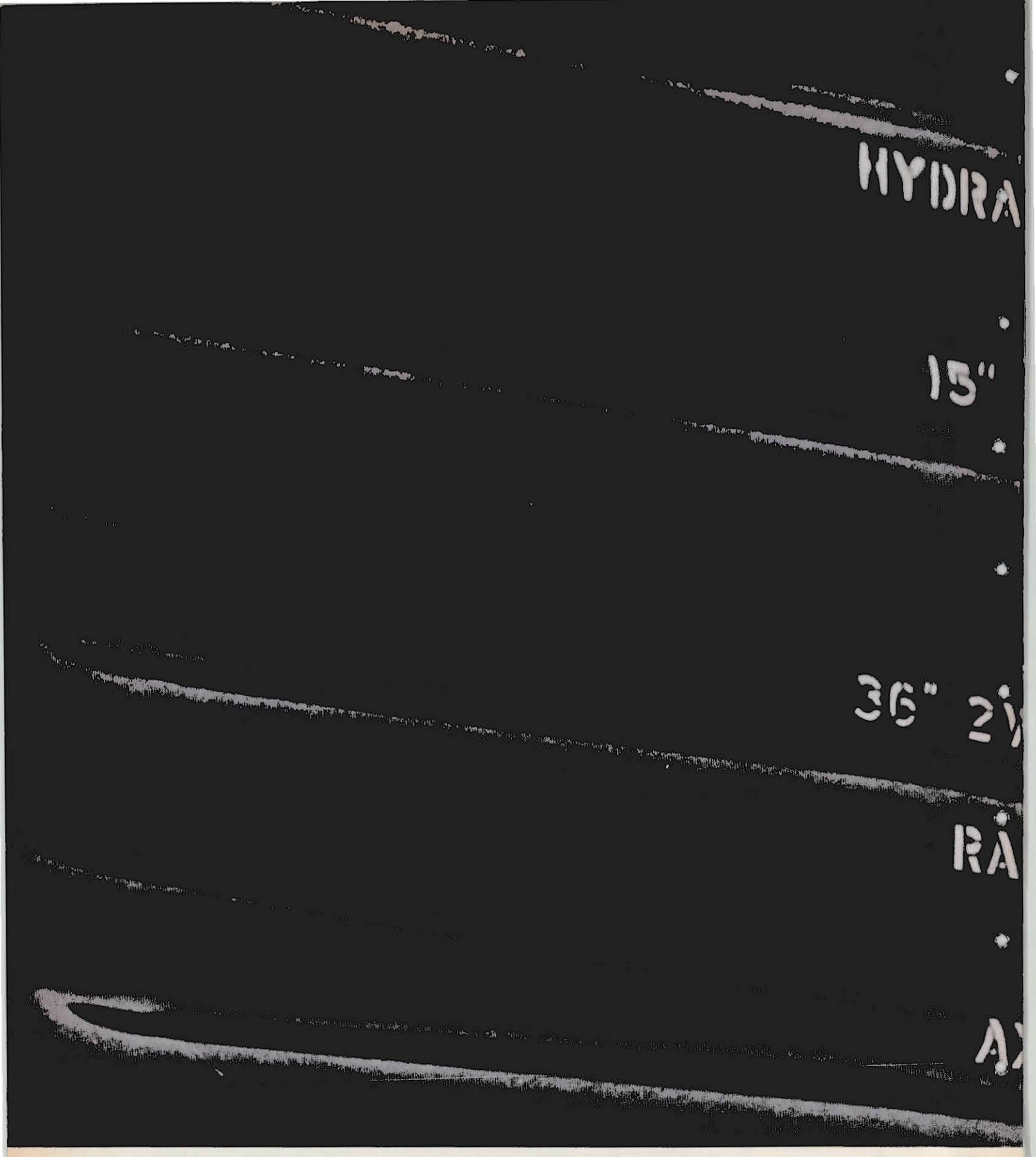


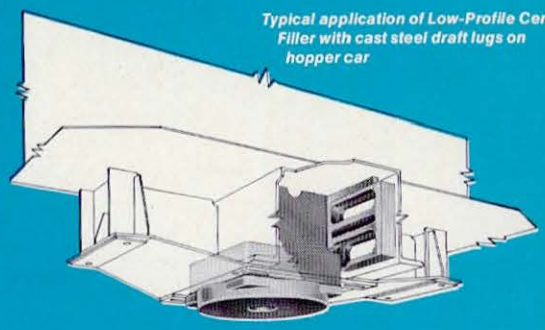
Stanray corrugated ends can take a lot because they give a little.

PROBLEM: CRITICAL INTERFACE BETWEEN TRUCK AND CAR BODY

DRESSER HAS THE SOLUTION

FOR RIGID UNDERFRAME CARS

Typical application of Low-Profile Center Filler with cast steel draft lugs on hopper car

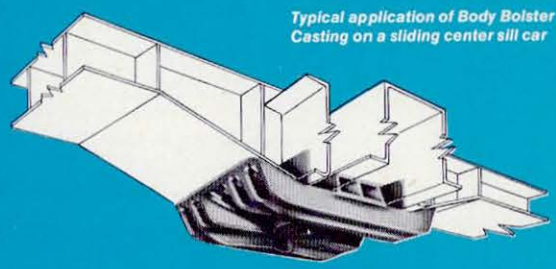


LOW-PROFILE CENTER FILLER (PATENTED)

Tested and proved in laboratory and actual road service, Dresser's Low-Profile Center Filler is a new concept in design engineering. It is devised to combine the structural advantages of a cast center filler with integral bowl with economic advantages of fabrications. There are over 15,000 carsets sold or on order to date, with up to 3-1/2 years of trouble-free service recorded on 100 and 125-ton cars—a true mark of dependability.

FOR CUSHION UNDERFRAME CARS

Typical application of Body Bolster Center Support Casting on a sliding center sill car



BODY BOLSTER CENTER SUPPORT CASTINGS

The effectiveness, superiority and value of Dresser's Body Bolster Center Support Castings has been proved for over 10 years now, with over 50,000 carsets applied on cushion underframe cars of all types. They were devised to provide the extra support needed for the overhang of 60 foot or longer cars, and are essential to the structural stability of cars with steel decks. Current castings are designed to meet all AAR specifications.

Call or write for all the facts

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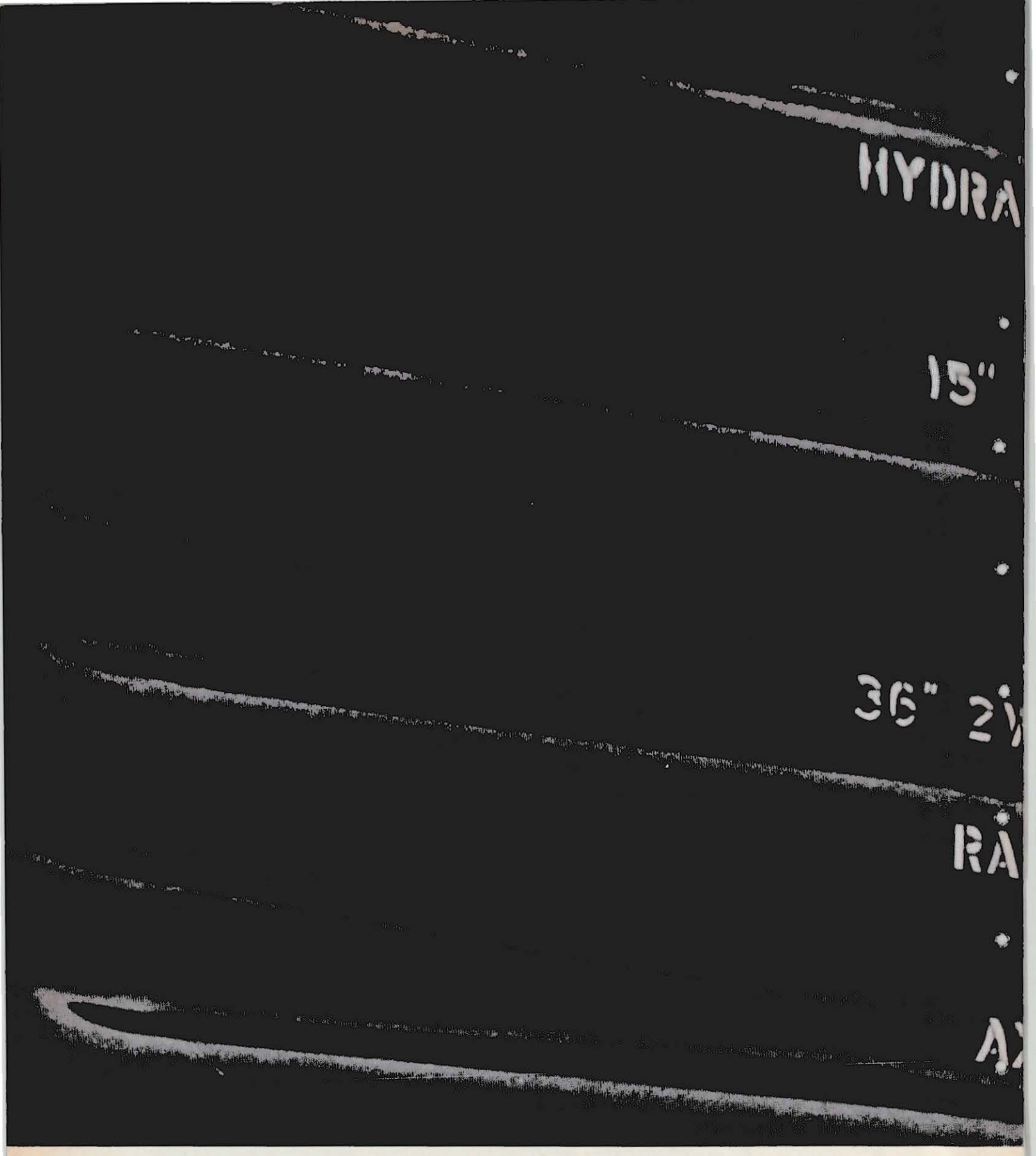
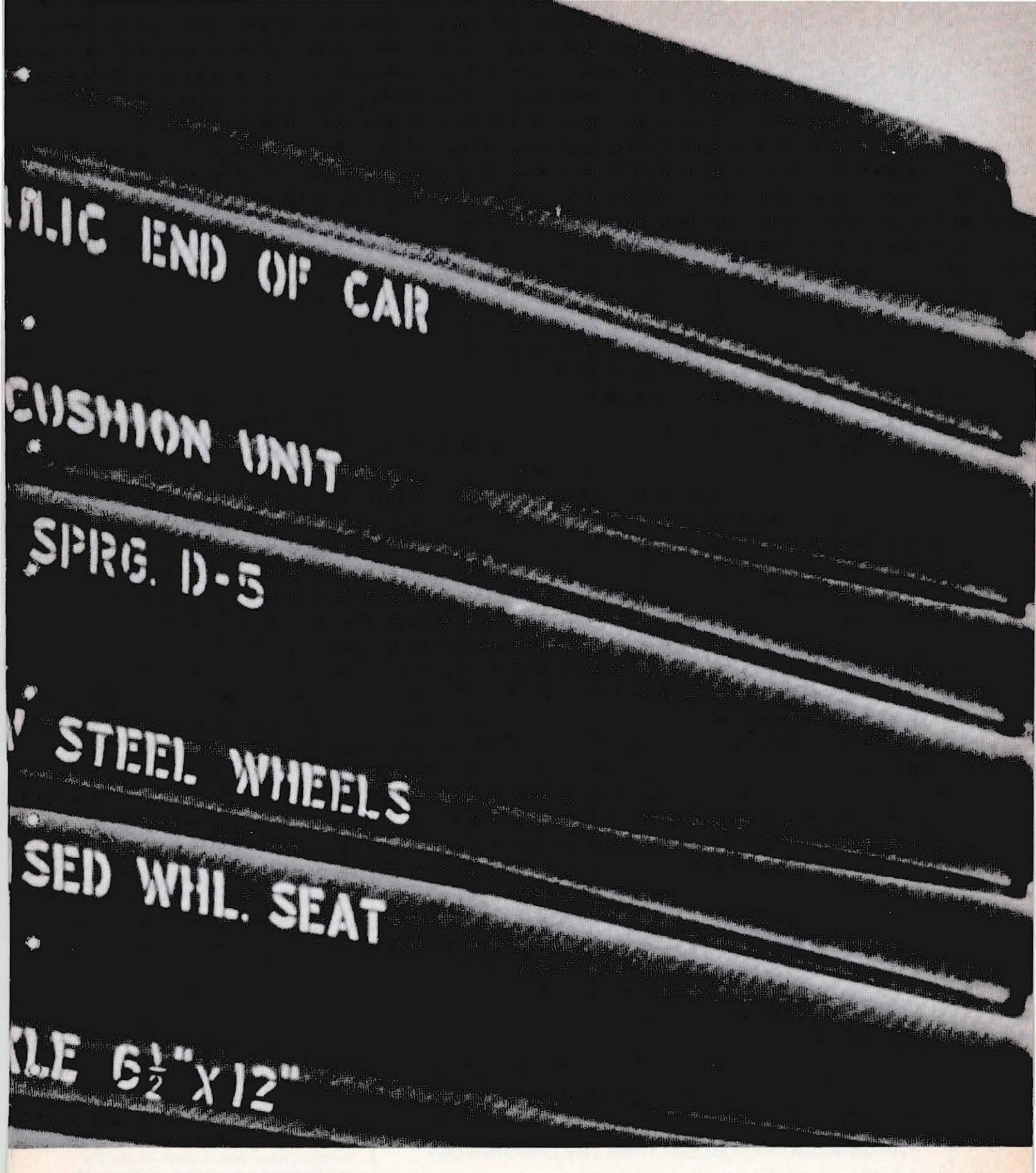


Stanray corrugated ends can take a lot because they give a little.



"A corrugated steel end with tapered and terminated corrugations will provide a maximum resistance with a maximum elastic deformation." That, in slightly technical terms, sums up the secret of our corrugated gondola and box car ends.

They absorb energy by recoiling when hit with lading. So you can expect longer life than you'd get with a solid flat plate end.

How good are they? Service records taken over the past 25 years show that on the average only *0.1%* of these corrugated ends had to be replaced in any given year.

Stanray corrugated ends are good enough to meet the requirements for any box car or gondola. So why not contact the Stanray representative and tell him what you need?

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Lines on Labor

GUS WELTY

THE ICC GETS ITS CHANCE

Leaving aside for the moment the artificialities of Phases 1-through-whatever of Administration economic policy, consider what normally happens when a business finds its costs climbing. The businessman raises prices, and the customer starts paying more for a roast or a Riviera or a ranch house. Much the same thing happens in the railroad industry—except that the railroads (along with other regulated carriers) always have that required intermediate step, government approval. That can—and usually does—take months, and even if the carriers eventually get what they set out to get, they have lost precious months in which the outgo was up but the income wasn't. Now, however, Congress has taken note, sort of, of the ICC's shilly-shallying on rates. When Congress OK'd the rail management/labor agreement which increases employer costs for Railroad Retirement, it also told the Commission to get with it on approving offsetting rate increases. And, after figuring the new costs, the railroads have filed their petition—for increases that work out to 2% effective Oct. 1, when the industry assumes that part of the employee-paid Retirement contribution which is over-and-above Social Security; and 2.7% next Jan. 1, when an increase in Retirement taxes takes effect.

If the ICC comes through as it's supposed to, the increases in rates will be permitted on the two dates. If the ICC dallies, the railroads are going to suffer—to the tune of $700,000 for each day after Oct. 1 that higher costs are in effect and higher rates are not. Obviously, it's the industry's hope that on or before Sept. 15, the Commission will permit the filing of tariffs, on a 15-day-notice basis.

HIGHER COST, HIGHER RATES—BUT ON WHAT BASIS?

Those requested rate increases have nothing to do with another upcoming cost escalation—the 4% wage increase that comes due Jan. 1. To its credit, the ICC is also looking at this kind of situation to see if something can be done, among regulated carriers generally, to get back at least part of labor-cost increases via the rate route. This "look" is still in a very preliminary stage. But the Commission apparently does have certain groundrules in mind, bearing on the ratios of labor costs to revenues and on rates-of-return. And the groundrules, in themselves, tell you something about the state of things in transportation. For instance, railroads would be eligible for a part-offset rate hike if the labor-cost/revenue ratio was 50% or higher and rate-of-return was less than 3% (with regional variations). Motor carriers would be eligible if the ratio was 50% or more and rate-of-return was less than 16%. Freight forwarders would be eligible with a 20%-or-more labor-cost/revenue ratio and a rate-of-return under 18%.

THE IMMEDIATE PROBLEM—THEN THE ONGOING ONE

As the railroads point out, productivity-increases are being eaten up by massive cost increases—and any real gains coming from traffic growth and/or increased efficiency are "desperately needed to sustain capital programs." Further, use of productivity gains (when available) to offset cost increases remains inappropriate while earnings are "far below. . .a fair, reasonable and adequate level." So now it's up to the ICC—to meet the instant problem now, and then tackle the broader one.

Heavy schedule of meetings is set

Within the next month, officers and supervisors of four key railroad departments will be meeting in annual conventions in Chicago and New York.

Leading off, Sept. 9-12 at the Pick-Congress Hotel in Chicago, will be the Coordinated Associations—the Air Brake Association, Car Department Officers Association, Locomotive Maintenance Officers Association and the Railway Fuel & Operating Officers Association.

Next up, Sept. 17-19, at the Conrad Hilton Hotel in Chicago will be the American Railway Bridge & Building Association and the Roadmasters' and Maintenance of Way Association of America. And, during the first week in October, the AAR Communications and Signal Section (Oct. 1-3) and the AAR Data Systems Division (Oct. 3-5) will be meeting at the Americana Hotel in New York with exhibits sponsored by the Railway Systems Suppliers running Oct. 1-4. About 60 suppliers will have space at this exhibit.

During Coordinated week, the joint opening session of LMOA and RF&OOA on Sept. 10 will hear Western Maryland President W.P. Coliton. An address by O.H. Zimmerman executive vice president-operations, Illinois Central Gulf, is scheduled for the RF&OOA meeting on Sept. 11. Status of the AAR/RPI tank car safety project is a topic of the CDOA meeting on Sept. 12. The annual Coordinated luncheon speaker on Sept. 12 will be Prime F. Osborne III, president and chief executive officer of Louisville & Nashville.

Highlighting the B&B and Roadmasters' sessions will be addresses by two chief executives—Illinois Central Gulf President Alan S. Boyd on Sept. 17 and Frisco President Richard C. Grayson on Sept. 18. An update report on activities at the High-Speed Ground Test Center is scheduled for the opening joint session on Sept. 17. The annual banquet sponsored by the Railway Engineering-Maintenance Suppliers Association will be Sept. 18.

Penn Central President William H. Moore and FCC Commissioner Charlotte Reid will be C&S speakers on Oct. 1. The speaker at the joint C&S/Data Systems luncheon on Oct. 3 will be Administrator John Ingram of the Federal Railroad Administration. There will be an address by ICC Chairman George M. Stafford at the Data Systems luncheon on Oct. 4.

Overseas, the World Railways Engineering Exhibition is scheduled for Basle, Switzerland, Oct. 1-5. Many cars, locomotives and maintenance devices are to be displayed.

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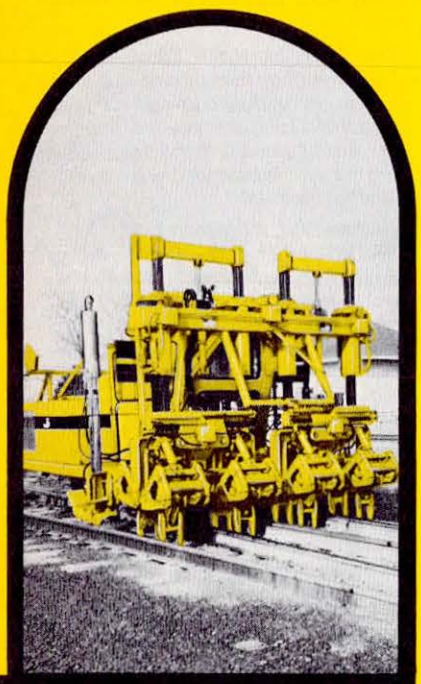
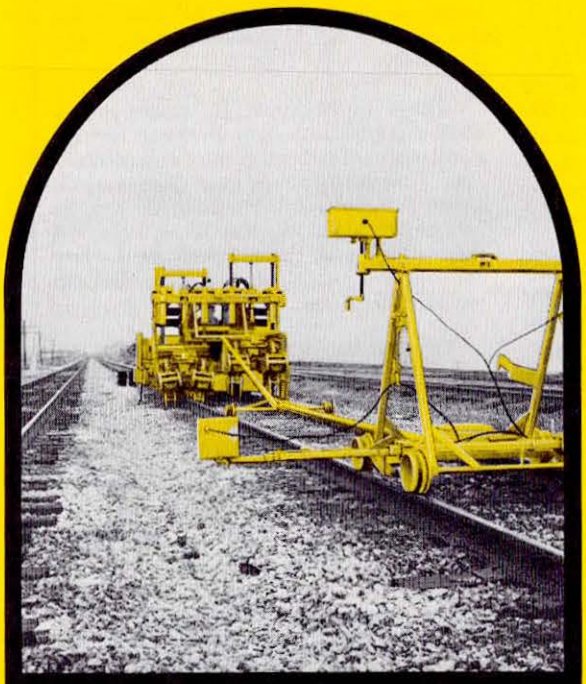
Jackson Model 2600 TampTrak is more than a fast-paced production tamper . . . it spots track . . . tamps switches . . . and it has the best lining capability in the industry with field-tested accuracy to 1/32". Now, *that's VERSATILITY!*



SWITCH TAMPING: traversing workhead design for tamping 100% of a switch, as well as lining of a switch — with up to 15,000 lbs. of thrust! Its switch tamping capability makes fast work of close tolerance areas — frogs, points, guard rails.



SPOTTING TRACK: patented solid state reference system . . . with dual sensor input . . . has visual read-out of individual rail surfaces. Rail lift to preset height is done automatically for fast . . . accurate spot tamping.

PRODUCTION TAMPING: new semi-automatic jacking lets operator raise and cross level quickly, efficiently . . . regardless of track conditions . . . all the time. Out-of face tamping speeds range from 700 to 900 ft./hr.

Besides versatility . . . in lining, spotting track, switch tamping and production tamping . . . what else do you get with a Jackson Model 2600 TampTrak? Jackson's patented Tilt-'n-Squeeze vibratory-action . . . it firmly compacts the ballast at the greatest load-bearing area — the intersection of the rail and the tie. In operation, the Model 2600's 16 tamping tools are inserted at both sides of the rail . . . then they're hydraulically tilted under the rail, to squeeze and compact the ballast . . . simultaneously, high-frequency vibratory-action causes the ballast to "flow" into a homogeneous, rigid structure — from the subgrade right up to the tie. What else? A price that's substantially less than the closest comparable equipment! Call or write for all the facts.

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PC restores storm-damaged D&H link

Through freight service was resumed on Aug. 25 over the last major railroad route to be rebuilt after last year's disastrous floods in the northeast. The announcement was made by Thomas E. O'Brien, Delaware & Hudson vice president of sales and industrial development.

In his announcement, O'Brien recalled that the 60-mile-long Penn Central route connecting its rail network to Wilkes-Barre, Pa., and the D&H at Buttonwood (near Wilkes-Barre), had not been used since high water caused several washouts along the Susquehanna River in the wake of Hurricane Agnes on June 23, 1972. Before the storm, over 55,000 cars a year were handled through the Wilkes-Barre gateway between D&H and PC. The heaviest volume of the traffic was primarily to and from New England points, the mid-Atlantic states and eastern Canada.

After the floods PC announced it would not reopen the line and that it planned to apply for abandonment of the Wilkes-Barre link. The D&H, along with shipper groups, local and state leaders, protested, which led to establishment of a temporary detour route over Erie Lackawanna tracks. The interim arrangement ended with restoration of the Buttonwood line.

Under the aegis of the Interstate Commerce Commission, and with the backing of congressmen representing the territory, O'Brien said, a Federal emergency flood loan bill was amended to require that PC must restore the line as a prerequisite to receiving Federal aid. In addition, D&H offered to pay PC a surcharge (over and above its normal compensation for freight carriage), for each loaded car to be moved over the Wilkes-Barre line between D&H and PC after restoration was complete. PC's rebuilding work is now virtually complete, "for which we are most gratified," O'Brien added.

The first D&H train to PC via the newly completed line was southbound manifest symbol freight RW-6.

Rail payroll topped $6 billion in '72

Who works for the railroads? By the 1972 count, close to 550,000 employees and more than that if all employees receiving pay are counted. And the compensation? That added up to $6,434,657,753 for employees of Class I railroads—the first time that total payroll has topped the $6-billion mark.

As usual, transportation department employees ranked first in the headcount with slightly more than 38% of total employment. Train- and engine-service employees alone added up to almost 30%. Next in line were employees in maintenance-of-equipment and stores, 21.52% and in the professional, clerical and general classification, 21.29%. Maintenance-of-way-and-structures accounted for 15.82%. And the executives, officials and staff assistants category came in with 3.17%, with a bit more than 16,700 persons out of the total reported Class I employment of 527,235.

Calendar

The next business meeting of the **Institute for Rapid Transit** will be held June 18, 1974, to be followed by the annual conference on June 19-21. The place: Century Plaza Hotel, Los Angeles, Calif.

The 1974 meeting of the **Railroad Public Relations Association** will be held in the Broadmoor Hotel, Colorado Springs, Colo., June 26-30.

Willard F. Rockwell, Jr., chairman and chief executive officer of Rockwell International Corp., has been named general chairman of the **Sixth International Conference on Urban Transportation.** The conference, to be held in Pittsburgh, Pa., May 20-21, 1974, will focus attention on current problems and new developments associated with urban mass and rapid transit systems.

Two two-day **ICC Institute** seminars on data communications for executive and operating personnel will cover such topics as data communication terminology, cost effectiveness, transmission problems, terminals, modems, multiplexers and over-all system design. The first, Oct. 1-2, will be at the Hanalei Hotel, San Diego, Calif.; the second, Oct. 15-16, will be at the Marriott Motor Hotel, Newton, Mass.

The national annual meeting of the **Delta Nu Alpha Transportation Society** will be held Oct. 10-13 at the Lord Baltimore, Baltimore, Md.

The Transportation Data Coordinating Committee has announced that the **1973 National Transportation Forum and Exhibit** will be held Dec. 4-5 in the Presidential and Congressional Ballrooms of the Statler Hilton Hotel, Washington, D.C. "Interfacing Transportation Data Systems" is the theme for this year's forum.

A special program covering the application of computers in transportation is planned as part of the 1974 **National Computer Conference & Exposition** to be held May 6-10 in Chicago's McCormick Place. Papers as well as suggestions for specific panels or sessions are solicited from all members of the computing community—especially those within the transportation field.

Which

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Progress in electronic hot box detector systems

The "Decision-Maker" Universal Alarm System brings the state-of-the-art in hot box detection to a new high level. And that's just what you'd expect from the No. 1 company in the field—Servo, the industry's pioneer designer and leading producer.

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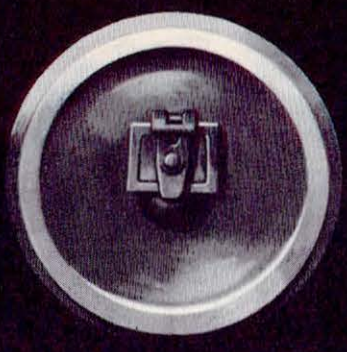
Hot box detectors available from Servo offer the widest flexibility in choice of system configuration, features and functional options. With our broad range of products and world-traveling network of field engineers, we can readily "customize" the design, manufacture, installation and operation of a SERVOSAFE System to best meet the particular requirements of your railroad.

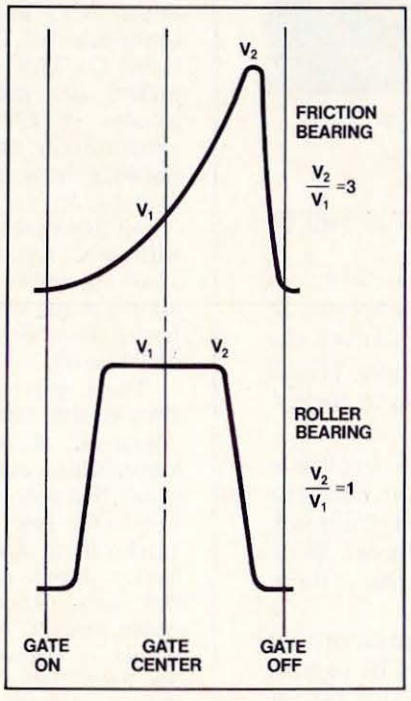
You are invited to contact us for complete descriptive literature, or to arrange a field engineering site survey and application review—without obligation, of course.

bearing has the hot box? the "Decision-Maker" knows!



Servo's new Universal Alarm System with automatic bearing identification*

The heart of our new Universal Alarm System is a unique bearing identification circuit known as "SWAT"—Split Waveform Analysis Technique. Because of their different heat transfer characteristics, roller and friction bearings produce different heat radiation "signatures" during the detector scan period. The SWAT circuit splits the gate scan period and compares V_1 with V_2. Typically, friction bearings produce a V_2/V_1 ratio of approximately 3, and roller bearings produce a ratio of approximately 1. The ratio sensed by the system is utilized to identify the type of bearing being scanned.



The "Decision-Maker" Universal Alarm is much more than the latest development in SERVOSAFE® Hot Box Detective™ Systems. It's a whole new concept designed to solve one of the toughest problems in hot box detection: **the difference in heat level characteristics between roller bearings and friction bearings**. The fact that normally-operating roller bearings run hotter than friction bearings has always presented a serious dilemma to railroad engineers. If you employ a low level alarm setting for early detection of overheated friction bearings, you run into the problem of too many false alarms on roller bearings. A higher setting to be consistent with roller bearings is not recommended as it can result in overheated friction bearings that pass by undetected.

Now, you don't have to make that difficult decision. Our new "Decision-Maker" Universal Alarm System will make it for you. It provides individually adjustable differential and absolute alarm levels for each type of bearing. It automatically distinguishes between roller and friction bearings, applies the proper alarm level, and actually makes the decision as to whether or not a hot box condition exists.

The Universal Alarm is available on new installations or as retrofit equipment for all existing models of SERVOSAFE Hot Box Detective Systems. If you'd like to put an end to the roller bearing vs. friction bearing problem, let us put the "Decision-Maker" to work on your railroad. Write or phone today for complete information.

*PATENT PENDING

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Watching Washington

DR. BRETEY'S Rx FOR PENN CENTRAL

The Department of Transportation's stated optimism that the private sector can be relied upon, in large part, to pay for the restructuring of northeastern railroads is a flickering hope, at best, in the eyes of Washington observers—particularly those who are abreast of current thinking in Wall Street. Of particular interest to Penn Central watchers along the Potomac are the recent comments of Dr. Pierre Bretey, the *doyen* of Wall Street's railroad analysts. Dr. Bretey, who is with Reynolds Securities, takes the position that only "a massive dose of capital" can save Penn Central, and he takes the further position that most of it must come from the Federal government. What is needed for the Penn Central alone, says Dr. Bretey, is this:

"1. Slimming down the system from 20,000 to 11,000 miles.

"2. At least $200 million for severance pay for those employees displaced in the event that 9,000 miles of marginal lines are abandoned. Monies will also have to be provided to subsidize either the cities or the industries if such lines are taken over by such agencies.

PIERRE BRETEY
"A massive dose of capital. . ."

"3. At least $100 million annually to recompense PC for its fully allocated costs of operating passenger trains for Amtrak.

"4. At least $130 million to cover fully allocated commutation losses over and above those subsidies provided by the various facilities in such states as New York, Connecticut, New Jersey and Pennsylvania.

"5. Interim cash to provide such working capital as will be necessary until the road begins developing earnings.

"6. A cash contribution by the Federal government of between $400-600 million for a period of from 4 to 5 years to allow full rehabilitation of the system, that is eliminating the deferred maintenance which may be as high as $1 billion. This is highly necessary if the company will be in a position to handle increasing traffic and become a viable railroad.

"7. Resolution of its major labor problems. In the event that the company could obtain as favorable an agreement with the UTU as was the case of the Providence & Worcester Railroad, PC would be the beneficiary to the extent of almost $500 million annually which would ensure the viability of the system. However, such a resolution is highly unlikely."

Equally unlikely is the adoption of Dr. Bretey's prescription by the Federal government. At the very least, though, he cannot be accused of understating the patient's ailment—and not as much can be said for everyone in Washington.

INGRAM PICKS BARRIGER AS AIDE

John W. Barriger, who has been in the railroad business for 56 of his 73 years, is back on the job again—as special assistant to Federal Railroad Administrator John W. Ingram. Barriger's most recent full-time railroad job was that of chief executive officer of the bankrupt Boston & Maine, a position which he resigned in December 1972. Prior to that he had served as president of the Katy, the Pittsburgh & Lake Erie and the Monon. He headed the Reconstruction Finance Corporation's Railroad Division from 1933 to 1941.

Penn Central, three years later

When the Penn Central Transportation Co. sought the protection of a Federal bankruptcy court late in June 1970, its management cited losses during that year's first quarter of $62.7 million—more than the deficit for the entire calendar year of 1969. A few days ago, as the ICC conducted hearings on a reorganization petition that could result in liquidation of the company's rail assets, Penn Central reported losses that made those of three years ago look puny. They were smaller than the deficits posted a year earlier, but not by any margin to justify optimism.

In July alone, the company lost $22.3 million, compared with a net loss of $29.8 million for July 1972. In the first seven months of 1973, the loss from operations was $121.9 million, compared with $135.9 million for the comparable 1972 period. The net loss for this year's first seven months was $105.4 million, after an extraordinary credit of $16.45 million resulting from consummation in June of settlement of the loan between Penn Central International N.V. and two leased railroad subsidiaries of Penn Central Transportation Co. This compared with a $154.7 million net loss for the first seven months of 1972, which included an extraordinary charge of $18.7 million resulting from tropical storm Agnes in June 1972.

All figures are reported in accordance with ICC regulations and make provision for certain rents, taxes and interest payments which are not being paid, having been deferred by the reorganization court.

There was also brighter news from Penn Central late in August. Welborn E. Alexander, Jr., assistant vice president-automotive, announced that in this year's first half the railroad transported 1,233,000 new automobiles, vans and trucks from assembly plants to distribution points, an increase of 30% over the same period in 1972. Alexander noted the PC "is already the largest carrier of delivered highway vehicles." To handle the rising volume, PC has built a second automobile terminal at Earnest, Pa., and has enlarged its unloading facilities at York, Pa., and Westboro, Mass. He said the railroad is arranging to acquire an additional 225 multi-level auto racks.

Another bright spot in PC's traffic picture has been piggyback—and PC last week announced that it has added a second Canadian base for TOFC/COFC traffic. The new TrailVan terminal, at Valleyfield, Que., will serve the Montreal area. It is the carrier's 38th piggyback terminal.

We'll stack our shoes with the best. Anytime!

With brake shoes, as with any shoe, you want the right style at the price you want to pay. Anchor® composition brake shoes give premium quality at competitive prices, and they're backed by 15 years experience in the field. Here are three sound reasons why your locomotives and freight cars should be wearing them...

1. Long Life. Anchor brake shoes last as long, and usually longer, than other composition shoes. Recent tests confirm this.

2. Low Cost. More manufacturers in the composition brake shoe field means a healthier competitive climate and competitive prices for the railroads.

3. Fast Delivery. The result of a recent plant expansion as well as warehouse centers in Indiana, Kansas, California, and Texas.

Compared with standard cast iron or high phosphorus iron shoes, Anchor composition shoes give smoother, more uniform deceleration from all speeds; lighter brake rigging for greater revenue hauling; and an anti-sparking feature to virtually eliminate fires on right-of-way or equipment.

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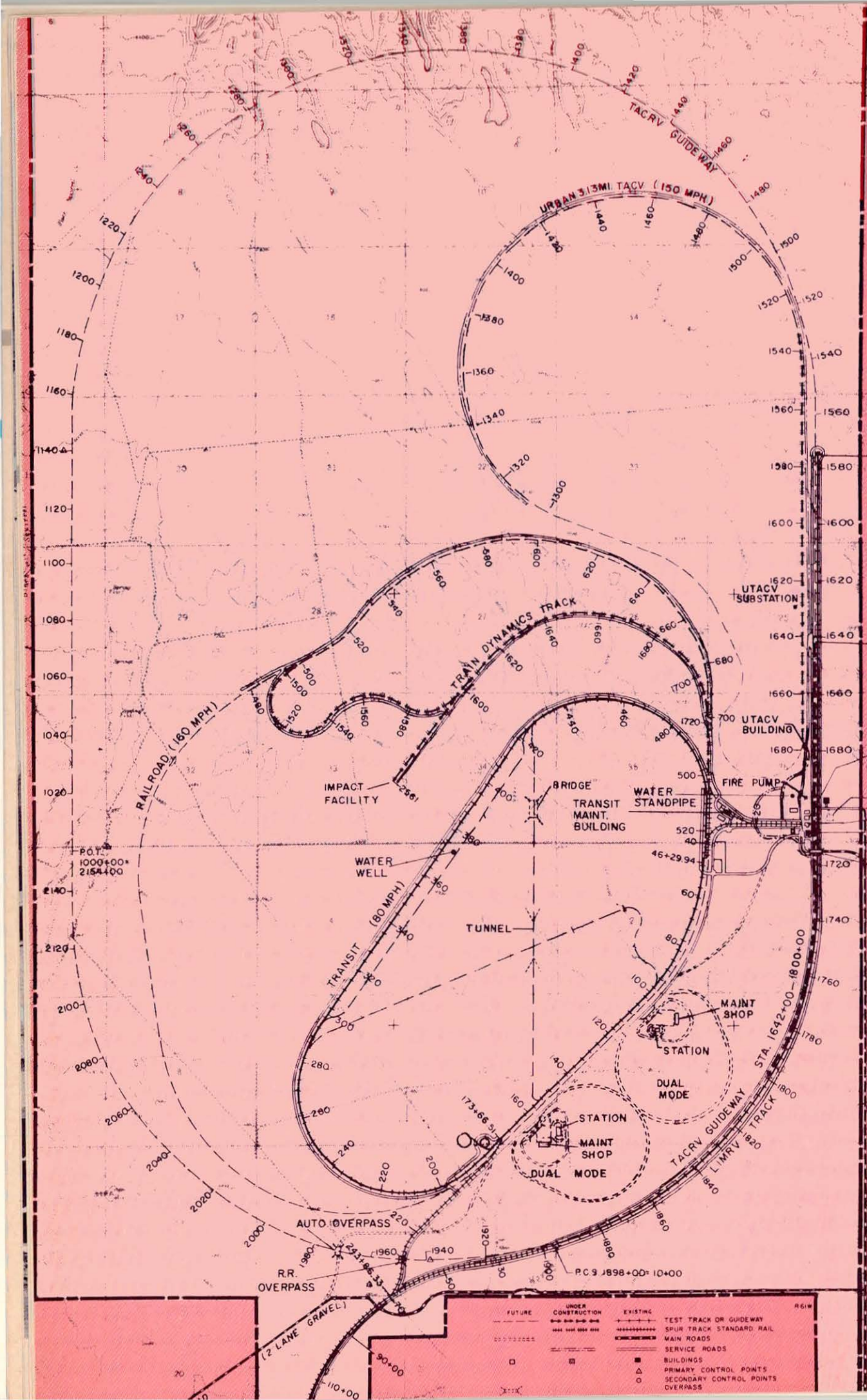
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RAILROAD (160 MPH)
P.O.T. 1000+00 = 2154+00
WATER WELL
TRANSIT (80 MPH)
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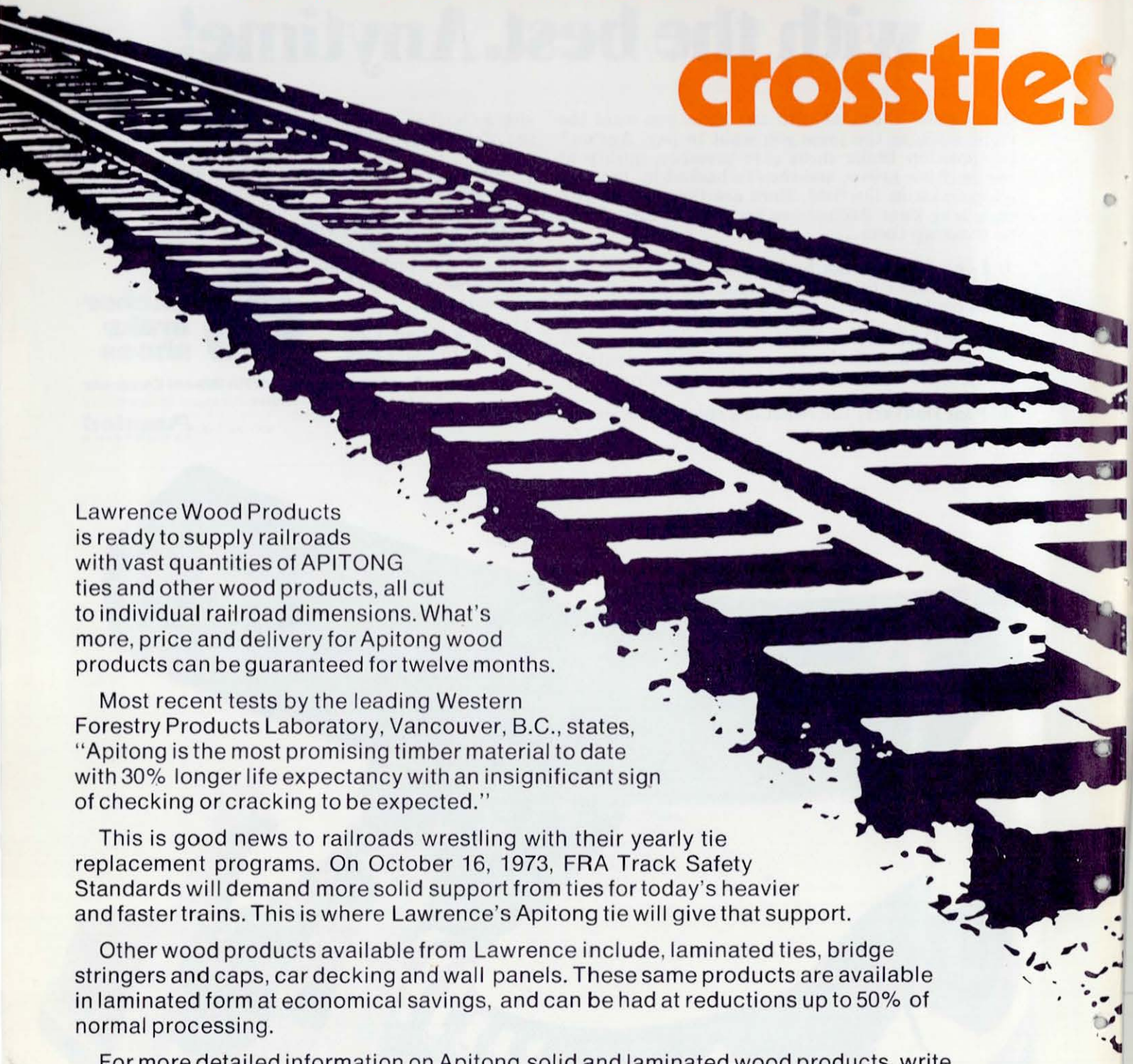

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Most recent tests by the leading Western Forestry Products Laboratory, Vancouver, B.C., states, "Apitong is the most promising timber material to date with 30% longer life expectancy with an insignificant sign of checking or cracking to be expected."

This is good news to railroads wrestling with their yearly tie replacement programs. On October 16, 1973, FRA Track Safety Standards will demand more solid support from ties for today's heavier and faster trains. This is where Lawrence's Apitong tie will give that support.

Other wood products available from Lawrence include, laminated ties, bridge stringers and caps, car decking and wall panels. These same products are available in laminated form at economical savings, and can be had at reductions up to 50% of normal processing.

For more detailed information on Apitong solid and laminated wood products, write Lawrence Wood Products, Box 3097, San Francisco, California 94119, (415) 391-0138.

Lawrence Wood Products

WOOD PRODUCTS FOR RAILROADS: SOLID AND LAMINATED TIES, BRIDGE STRINGERS AND CAPS, CAR DECKING AND WALL PANELS.

have enough wood to lay 100,000 miles of track, bridges & crossovers.

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73-22

KOPPERS
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Circle 13 on reader service card

Products for Productivity

What users of rail transportation today are seeing is, in many ways, the physical rebuilding of the nation's railroads, from the ground up.

Of necessity, in large part financial, this is a gradual process. It depends, to a large extent, on advanced and advancing technology and on the ability of a supply-and-support industry to provide that technology. It depends on the ability of the railroads to acquire and use the new technologies, and to keep their application in proper phase. It depends, always, on the infusion of large doses of research-and-development by the railroads themselves, by suppliers, by government, and by all three working together.

This rebuilding of the railroads and the improved productivity which it helps make possible can be assessed in a couple of ways.

One is via the more-or-less traditional route, through performance measurements of individual operations. The other is through measurement of the total operation, taking into account the contributions made by the various pieces that add up to the whole. In maintenance of way, for instance, a department's productivity may start looking better with the introduction of equipment and techniques designed to improve the quality of the work and/or lower its costs. But for system productivity to show an improvement, revised m/w operations have to be tied into the total operation so that m/w gets the maximum from its equipment and techniques, consistent with the over-all goal of keeping train operations working reliably and without delay.

For the productivity improvements that product improvements can produce, railroads used to practice large measures of self-reliance—but no more. Perhaps it has been the recognition that railroads are in the transportation business and not the manufacturing business. Perhaps it has been the realization that suppliers, more often than not, can do a more efficient and more wide-ranging job of furnishing railroad equipment and devices than can individual railroads. Whatever the reasons, the partnership that has developed has, by and large, worked well. Not perfectly, because both industries are still plagued by peak-and-valley order cycles and manufacturing operations don't work at their best when the flow is interrupted. But, everything considered, the system does work.

Whether it continues to work depends on factors not entirely within the control of railroads or suppliers. The northeast crisis cries out for solution, hopefully a solution that will keep operations in the private sector. Congress has yet to act on important railroad legislation, although the Senate has approved a freight-car bill which provides up to $2 billion in loan guarantees. Financing of fixed-plant improvements continues to be a problem for many roads. And rail labor's attitudes bear close watching, not only in broad economic terms but also in terms of specifics such as insistence upon maintaining or creating railroad jobs and work which could be more effectively handled by the supply-and-support industry.

Within industry control—and a current bright spot—is the R&D effort. As RPI President Nils A. Lennartson points out, "There's no question that there has been a substantial increase in funds expended in this area in recent years." Examples: the $1.25 million AAR/manufacturers car-safety research project; a $100,000 AAR/RPI coupler research project; a $100,000 truck-component research project with the same sponsoring agencies; and, perhaps most significant, the $2.6-million, 10-year track/train dynamics study which is being financed, in approximate terms, 50% by the railroads, 30% by FRA and 20% by RPI-member companies, and certain non-members who have been invited to participate. This is the kind of effort that has long been needed—the kind of effort which can be built upon to give the nation railroads capable of meeting tomorrow's much increased needs.

That, in effect, is what "Products for Productivity" is all about—one industry's products for another industry's productivity, at a mutual profit.

M/W productivity: "Good machines

Machines that will perform work better, faster and with fewer men are one way to greater productivity in the maintenance-of-way department—but not the only one. Maybe it's not even the most important means of making the most effective use of the M/W dollar.

Certainly, it's important for a railroad to have the latest machines for maintaining track. But the interests of productivity are not being served if this equipment spends a good part of the working hours sitting idle on a siding or set-off, or if it is idle because trained personnel is lacking for making repairs when breakdowns occur.

Neither are the interests of optimum productivity being served if price or cost is put ahead of durability in the purchase of materials or in the conduct of work.

● **Keeping machines working.** Consider first the matter of keeping machines working. The problem of getting maximum on-track time is one over which only the railroads have control. There is nothing the manufacturers can do about the productive time their machines lose while waiting for trains to pass—that is, nothing except to lament a situation which they feel is within the power of the railroads to correct if it were given a higher priority.

But the manufacturer can do something about solving the problem involved in preventing lost time due to mechanical breakdowns. In developing new or improved machines, he has two options. One is to simplify the design as much as possible, but this may have the effect of reducing the degree of automation, a factor that is important in achieving maximum efficiency.

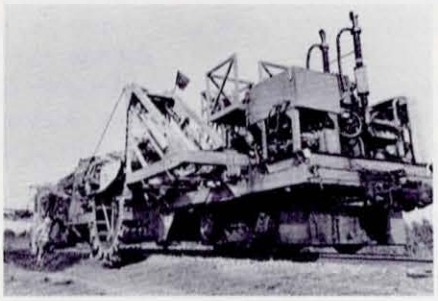
The second is to maintain a high degree of sophistication in automation, but to design the controls in the form of units or modules so that they can be replaced as units, thus avoiding the necessity of having highly-trained personnel to repair them in the field. In conjunction with this option, the manufacturer can work to win the cooperation of his customers in training railroad personnel in the proper operation, maintenance and repair of the equipment.

● **Modularized controls.** A manufacturer of sophisticated M/W equipment explains how his company is using the second option: To achieve optimum efficiency, a particular machine manufactured by his company was hydraulically-actuated but electrically-controlled. In the interest of simplifying repairs, panel-mounted hydraulic valves were used and also printed electrical circuits. This way, he says, entire control systems could be assembled as modules. Thus, if trouble develops in the field, the module can simply be removed and replaced, avoiding the necessity of making repairs on the spot.

With the machine quickly back in service, the defective unit is then sent to the manufacturer's plant where sophisticated equipment is maintained for diagnosing the trouble. To make this possible, the manufacturer recommends that railroads with several of its machines in service maintain an extra control box on hand.

As another measure to achieve optimum production from its equipment,

Products for Productivity



New machine makes a 6-inch undercut below tie bottoms

Kershaw Manufacturing Co.'s new track undercutter works at a rate of 1,300 to 1,700 feet per hour, depending upon cutting conditions. This is done while producing a six-inch cut beneath bottoms of ties.

The shoulder ballast is first excavated and the tie ends undercut ahead of the track undercutting chain. This sequence of operations eases the load on the undercutting chain. A ballast-cleaning attachment for this unit is being developed.

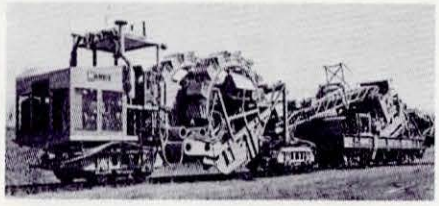
Circle 70 on reader service card

two 60-foot flat cars for shipment between distant job sites. It has a travel speed to and from work locations up to 25 mph in either direction. It has a variable working speed up to 1 mph, depending on conditions, depth of cut and amount of ballast to be cleaned.

The shoulder ballast cleaner is built in two units which are coupled together in use. The first unit contains the two diesel engines, controls, ditching wheels and conveyors that carry the shoulder material to the screen car.

The screen car cleans the material, distributes the cleaned ballast, plows and regulates it and disposes of the waste material by conveyor. The latter will deposit the waste to either side up to 28 feet from the center of track. Or a car can be towed behind and the waste dumped into it.

Circle 71 on reader service card



Self-sufficient ballast cleaner is available on a contract basis

Another self-propelled shoulder ballast cleaner has been added to the Mannix line of maintenance-of-way equipment. Available under contract with the Maintenance of Way Division of Mannix Construction, Inc., the new unit is completely self-contained and is designed to load and unload itself on

Machine breaks up encrusted deposits and cleans yard tracks

The Marmon Yard Patrol is a machine, weighing about 25 tons, that is designed to loosen deposits inside and outside the rails and to gather, elevate

are no good standing idle"

this manufacturer, in common with many others, has suggested to its railroad customers that men responsible for maintaining the equipment in the field be sent to the manufacturer's plant for training. But, more often than not, the response from the railroads is that they can't release the men from their duties for the several days required.

The trouble is that, in the absence of such training for their repairmen, the railroads are prone to ask the manufacturers to send servicemen into the field to diagnose and correct trouble when it develops—this, of course, at the expense of the manufacturer.

● **An idea that worked here. . .** As at least a partial solution to the problem, one manufacturer tells of an arrangement it worked out with a railroad that had purchased several of its machines. "We arranged with this road," he says, "to bring all its repairmen into a central point at a prearranged time. We had our men there equipped with slides and other visual material. Thus, we were able to give the railroad men a full day

and load the material either into a car coupled to the rear of the unit or into cars on adjacent tracks.

It is mounted on rubber tires for over-the-road travel and has rail guide wheels that are used when the machine is in operation. Material inside and outside the rails is loosened by a series of ripper teeth which span a width of 14 feet. Behind the teeth are ingathering wings that place the loosened material in front of rail plows that form a windrow in front of a bucket elevator. A rotary broom, mounted directly behind the bucket elevator, throws the material through the openings between the buckets to form a windrow ahead of the elevator.

The track-cleaning features also include a rotary brush device for cleaning the web and base areas of both sides of each rail. These base and web sweeps are brought into action only during the final pass of the machine.

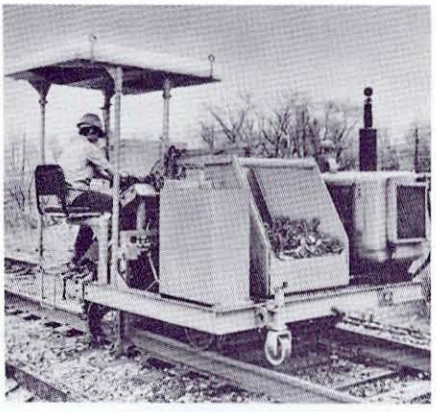
Material picked up by the elevator is delivered to a discharge belt conveyor which can swing in an arc of 160 degrees for loading into cars. A drag-chain conveyor is used for leveling and distributing the material in the cars.

The Yard Patrol is designed to load material at the rate of 100 cu yd per hour. It is powered by a GMC 4-71 diesel engine which drives a Delco 75-kw generator for powering the electric motors to run the broom, belt conveyor, bucket conveyor and drag conveyor. It is manufactured by Railway Products Co. Division of the Marmon Group.

Circle 72 on reader service card

Ties on welded-rail strings are box-anchored by machine

Nordberg's Anchor Applicator is a one-man-operated machine that applies two anchors simultaneously to box-



anchor ties at the rate of 540 boxed ties per hour.

Anchors are loaded into a receiving bin and are raised hydraulically to spill into an elevated bin so they are within easy reach of the operator. The storage bin holds 1,100 anchors, sufficient to fully anchor a 1,440-ft rail string.

The operator picks up two anchors and drops them properly oriented into separate chutes that feed the applying mechanism. The latter floats on the main frame of the machine so the operator can properly position the mechanism even though the machine is not exactly centered over the tie to be box anchored. If a tie is to have only a single "back-up" anchor, the operator loads an anchor only in the chute on that side of the tie.

The work cycle of the applying mechanism is fully automatic, sequenced by a solid-state logic system with manual override for all functions. After spotting the mechanism, all the operator has to do is push a "start" button and load the next pair of anchors.

The Anchor Applicator, manufactured by the Nordberg Machinery Group of Rexnord, is powered by a GMC diesel, two-cylinder engine. The hydraulic pump is a Vickers two-section vane pump, the pressure of which can be varied by a relief valve from 1,400 psi to 2,800 psi. The unit is equipped with a turntable for reversing the direction of work. It travels light at 20 mph.

Circle 73 on reader service card

Drives two pre-set spikes per tie at rate of four ties per minute

A new machine, the Jackson Rotary Single-Head Spike Driver, has been made available for driving two pre-set spikes per tie at the rate of four ties per minute. Manufactured by Jackson Railroad Equipment Co., the unit is intended for use by small spiking gangs, rail-laying gangs and track-construction outfits.

The spike driver incorporates four independently driven rotating spuds in its press head which bore down on each side of the rail and each side of the tie through even the most compacted ballast, it is said. When the press head is down, the spuds stop rotating and clamp the tie securely while the two spikes are hydraulically driven home. Over-driving is prevented by controlled hydraulic pressure.

The machine, a one-man-operated

of indoctrination and intensive training in making repairs to our equipment."

● . . .**But not here.** This plan works fine—sometimes. Another manufacturer explains why there are failures: "We had arranged for several of our experts to travel more than a thousand miles to put on a school for a particular railroad, but only a handful of the men we expected were there. To us the results weren't worth the expense."

So it goes, as the manufacturers continue their efforts to achieve arrangements with the railroads aimed at reducing machine downtime and boosting productivity. They are also continuing efforts to enhance productivity by making improvements in existing equipment, or occasionally bringing out entirely new machines. Since practically every track-maintenance operation has already been mechanized, the new machines are apt to be competitive with units already on the market. Right now several companies are working on tie-disposal machines, and another company has just introduced a new track-cleaner for use in the yards.

● **Developments in ballast-cleaning.** Ballast-cleaning is an area where several manufacturers are pushing efforts to develop more efficient equipment—efforts sparked both by competition and by the urging of railroaders who see the need to do more ballast-cleaning but want to do it faster and more cheaply than is possible at the present time.

Responding to a greater demand for its services, Speno now has under construction its ninth ballast-cleaning train. In the new train changes are being made that will make it possible to accomplish in one pass the work that now requires two passes. Productivity thus will be doubled.

Kershaw has just announced a new track-undercutter which in tests was reported to operate at the rate of 1,300 feet to 1,700 feet per hour, and is now working on the design of a combination undercutter and ballast-cleaner designed unit with manual hydraulic controls, has travel speeds up to 20 mph. A hydraulically powered turntable, fitted beneath the machine, permits rapid reversing so that both sides of the track can be worked. With this turntable and other equipment provided, off-tracking can be easily accomplished in two or three minutes.

The Jackson Spike Driver is powered by a Wisconsin 18-hp engine with a Vickers hydraulic pump. It is built with an all-welded steel frame and heavy-duty equipment for dependable operation with a minimum of maintenance.

Circle 74 on reader service card

New cab, increased strength on improved Ballast Equalizer

A larger, pressurized, sound-dampened enclosed cab, featuring tinted acrylic windows, with optional climate control, is one of the new features of the latest Model BEA-17 Ballast Equalizer by Tamper.

The new cab is designed to provide optimum operator comfort and efficiency utilizing air-hydraulic controls and wide-range visibility. The controls for all attachments are the toggle-switch type, electro-hydraulic, for ease of operation. All safety devices can be quickly applied from inside the cab.

Other improvements include hydrostatic four-wheel drive with an eight-speed transmission which provides infinitely variable speeds up to 35 mph in each direction; four-wheel air-over-hydraulic disc and hydrostatic braking, with 24-inch-diameter AAR tread-and-flange contour cast-steel wheels mounted on heavy-duty truck-type axles. A new rubber elastomer suspension also has been incorporated. The fuel capacity has been increased to provide longer working periods.

Circle 75 on reader service card

New tamper model is fully automatic, one-man operated

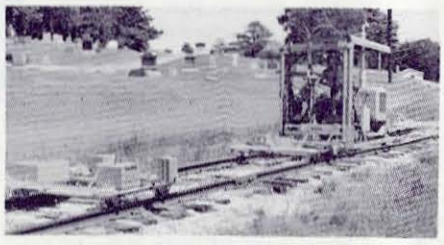
Tamper's latest tamper-liner, Autojack Electromatic Model EJ-6, is said to be a fully automatic, one-man production tamper that insures absolute accuracy in tamping and leveling both tangent and curved track, using the infrared "Delta Levelling System."

Features of Model EJ-6 include four-wheel disc brakes, a fully enclosed cab with optional climate control, and controlled down-feed depth for assuring the proper tamping depth prior to squeeze-in. Travel speeds up to 40 mph are made possible by a selective-gear transmission.

An automatic sequence of operation, electro-hydraulic and finger-tip controlled by the operator, provides the Electromatic quality of production rated at speeds in excess of 1,650 feet per hour. The operator has an unobstructed view of each tie being tamped and the comfort of a sound-dampened fully enclosed cab.

The Electromatic tamping tools and sequence of operation are incorporated in Model EJ-6 to assure uniform consolidation of the ballast under the tie. The split workhead may be operated independently or together so that all tools penetrate the ballast at one time. The 16 tamping tools vibrate at 3,200 vpm with a positive displacement of 3/8 of an inch. The Autojack Electromatic is equipped with a center-jack turntable that jacks from the rail as standard equipment.

Circle 76 on reader service card



More accurate lining with less maintenance

The W111 and W112 Track Lining units manufactured by Fairmont Railway Motors, Inc., have been improved to line track more accurately than ever with less maintenance. The new Target Car has simplified electric drive. Remote control is standard with manual operation optional. The Target Car will operate up to 600 feet ahead of the W111 Liner and has disc brakes that apply automatically.

Improved pre amp and code boards plus two sealed-beam units are said to require less maintenance. Neither sun, wind nor gravity can affect the improved accuracy of this three-car track-lining system it is said. A keyed beam of infrared light is the reference source.

Circle 77 on reader service card

On/off-track heavy-duty crane rerails rolling stock

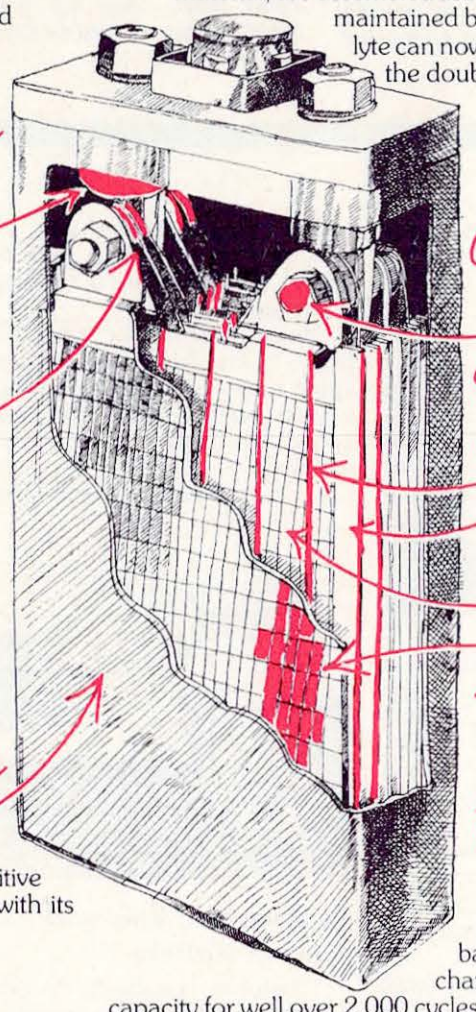
An all-hydraulic, one-man-operated, on/off-track rerailing crane, Model 160 RR/WC, is the world's largest and is

The more you learn about rapid-transit battery systems the more you'll think of Exide®

1. The positive advantages of pocket plates in nickel-cadmium batteries.

It's difficult to imagine how a rapid-transit system could operate without batteries. They provide the trains with current needed at intermittent periods. They make it possible for relays to control vital switchgear and signal lights. And they stand ready to supply life-saving current in emergency situations.

Modern rapid-transit systems are placing a wider variety of loads on their batteries than ever before. And they need a battery that can effectively handle these loads as well as stand up to all kinds of environmental conditions.



The rugged design of a nickel-cadmium battery.

Just a look at the nickel-cadmium alkaline battery tells you it's made to last. A durable container of steel or poly-vinyl chloride. Perforated, steel pocket positive and negative plates with rugged steel U-frames to prevent loss of active material. Solid plastic separators to maintain plate spacing and stop cell shorts. Steel washers on steel conductor rods to keep the plates firmly in place. All tightly locked together to massive cylindrical posts. Once assembled, the nickel-cadmium battery is rugged enough to keep operating under any conceivable rapid-transit situation. There are two positive plate designs you can choose for this battery, each with its own distinct advantages.

Single-pocket positive plates provide light-to-medium discharges.

In a nickel-cadmium battery, a negative plate has a greater discharge capacity than a positive plate with the same amount of surface area. This difference can be overcome by having more positive than negative plates and by increasing the surface area of each positive plate. All Exide/Alcad pocket plate nickel-cadmium batteries use more positive than negative plates. But the single-pocket positive plate is not constructed to increase its surface area relative to the negative plate. The active material is simply locked inside single pockets of finely perforated steel. Since this surface area is no larger than the negative plate, a balance is established between the two that makes the single pocket approach correct for rapid-transit applications where medium discharge rates and light-to-moderate duty are involved.

Double-pocket positive plates ideal for deep discharges.

To match the discharge capacity of the negative plate, the Exide/Alcad double-pocket approach actually doubles the surface area of the positive plate. Two sheets of single-pocket plates, each containing their active material, are assembled in a single frame with a space maintained between them. The electrolyte can now circulate on either side of the double-pocket plate, as well as between the two sheets of pockets. This tremendous increase in square inches of surface area allows the double-pocket positive to match its discharge capacity to the negative plate. Because of this, the battery can handle deep discharges up to 80% of its rated capacity for well over 2,000 cycles. These features make the double-pocket battery a perfect choice for all heavy-duty rapid-transit applications.

Exide pocket plate batteries and modern rapid-transit systems.

Today's growing rapid-transit systems need a battery that can stand up to the punishing demands of high-speed rail transportation. At the same time, a battery must offer a wide choice of discharge capacities to cover all the varied rapid-transit applications.

Exide nickel-cadmium pocket plate batteries are built to take the punishment. And single or double-pocket plates make it possible to ideally match the discharge capacities needed to operate the most reliable and economic kind of modern rapid-transit system.

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Circle 14 on reader service card

to operate at the rate of 1,300 feet per hour while undercutting the track six inches.

Mannix, which makes shoulder ballast-cleaners and also equipment that plows out the old ballast or raises the track on the existing ballast, has embarked on plans to produce integrated equipment for removing and cleaning the entire ballast section. The machine now on the drawing boards would be designed to do the job in two passes and would operate at a rate of about 2,500 feet per hour.

To some extent the efforts of these companies are motivated by current thinking on Santa Fe to the effect that, when certain assumptions are satisfied, it is more economical to undercut the track and clean and restore the ballast than to continue the practice of skinlifting and spotting the track at relatively frequent intervals. Here is another area in which the interests of productivity can be served.

● **Durability and productivity.** The importance of durability in promoting productivity may often be overlooked. But this importance can be brought quickly into focus merely by mentioning the contribution made by continuous welded rail. Quite probably, no other single idea has produced such large savings in maintenance-of-way as the butt-welded joint, simply because it has promoted durability of the track surface. And that is the essence of productivity.

The importance of durability can be seen in other areas. It can be seen in the act of surfacing track. No matter how fast and cheaply the job has been done, the work has not been done economically if the surface and line don't stand up for a reasonable length of time.

It can be seen in locations where the roadbed is unstable, resulting in heavy expenses to keep the track in surface. A development that is giving results in this area is the practice of injecting lime slurry into the roadbed where clayey soils predominate.

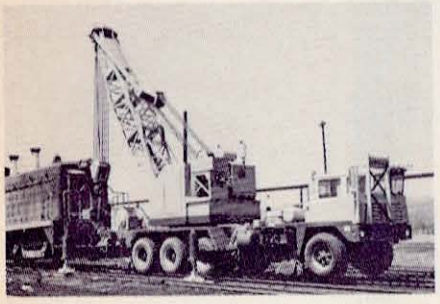
Also, the importance of durability can be seen in developments involving the insulated joint. Railroads report that large savings are being realized through the use of "glued" insulated joints in continuous-welded-rail territory. Thus, the glued joint becomes an instrument for serving the interests of productivity.

So does such a mundane item as the insulation used in insulated joints. To replace the fiber insulation that has been used for so long in continuous insulated joints, Portec, Inc., has introduced a type of insulation made of a thermoplastic material. According to the manufacturer, laboratory and service tests have indicated that the new insulation will have a life five to ten times that of fiber insulation, enough presumably to justify the increased cost of 15% to 30% over fiber insulation.

● **Coatings for bridges.** Increased cost, however, has often been a stumbling block to the railroads' taking advantage of greater durability. Protective coatings for steel bridges afford a glaring example. Various low-cost coatings for this purpose have been offered from time to time, and low cost has promoted many railroads to make use of some of these coatings—frequently with results that have been dismaying to the engineers responsible for bridge maintenance. They realize that the best interests of economy—and productivity—would be served if more durable and effective coatings were applied even at greater expense.

Meanwhile, in the track field, the manufacturers may be expected to continue their efforts to bring out more productive machines. Always in the background in this area are plans, still in the embryonic stage, to harness the computer to track machines, resulting in the ultimate in automation. The computers that have been placed on track-recorder cars are a step in this direction. Such cars are coming into wider use now for the purpose, among other things, of providing management with a better guide to the allotment of M/W funds. And that, since it results in more effective use of the maintenance dollar, also means greater productivity. ■

capable of rerailing the heaviest locomotive, according to its manufacturer, Pettibone Corp. The crane is rated at



80-ton capacity at 13-foot radius with outriggers over end, and 32.5-ton capacity with out-riggers over sides. It has a pendent-supported, hydraulic power-elevated boom, 25 feet long, with a 10-part main hoist. The boom hoist and material hoist are self-locking, hydraulic-actuated, worm drive gear box with power for both up and down operations. The upper turret has 360-degree rotation on a sealed 62-inch, ball-bearing swing circle.

The crane is powered by a Detroit diesel 6-53, six-cylinder engine having a displacement of 3/8 cu in. and a horsepower of 185 at 2,500 rpm. It has four hydraulic pumps driven through a Funk pump-drive unit. The chassis is powered by a Detroit 6-71N diesel, six-cylinder engine having a displacement of 426 cu in. and a horsepower of 238 at 2,100 rpm. It has an oil-bath type air cleaner and an 80-gallon safety fuel tank.

Model 160 RR/WC has a road speed of about 50 mph and a rail speed of up to 30 mph. On the rails it is carried by Fairmont Model 40-72 rail units with air brakes front and rear, and on the road by triple, tandem Rockwell standard STDD rear axles and a Rockwell FL901 front axle.

The crane cab is extra large with a slanted windshield for maximum visibility. The chassis steel cab is of the two-man, two-door type, with one seat behind the other, and is equipped with tinted safety glass.

Model 160 RR/WC has an over-all length of 41½ feet with the boom of the upper turret in its lowered position, an over-all height of 12½ feet with the upper turret and a width of 8 feet 0 inches.

Circle 78 on reader service card

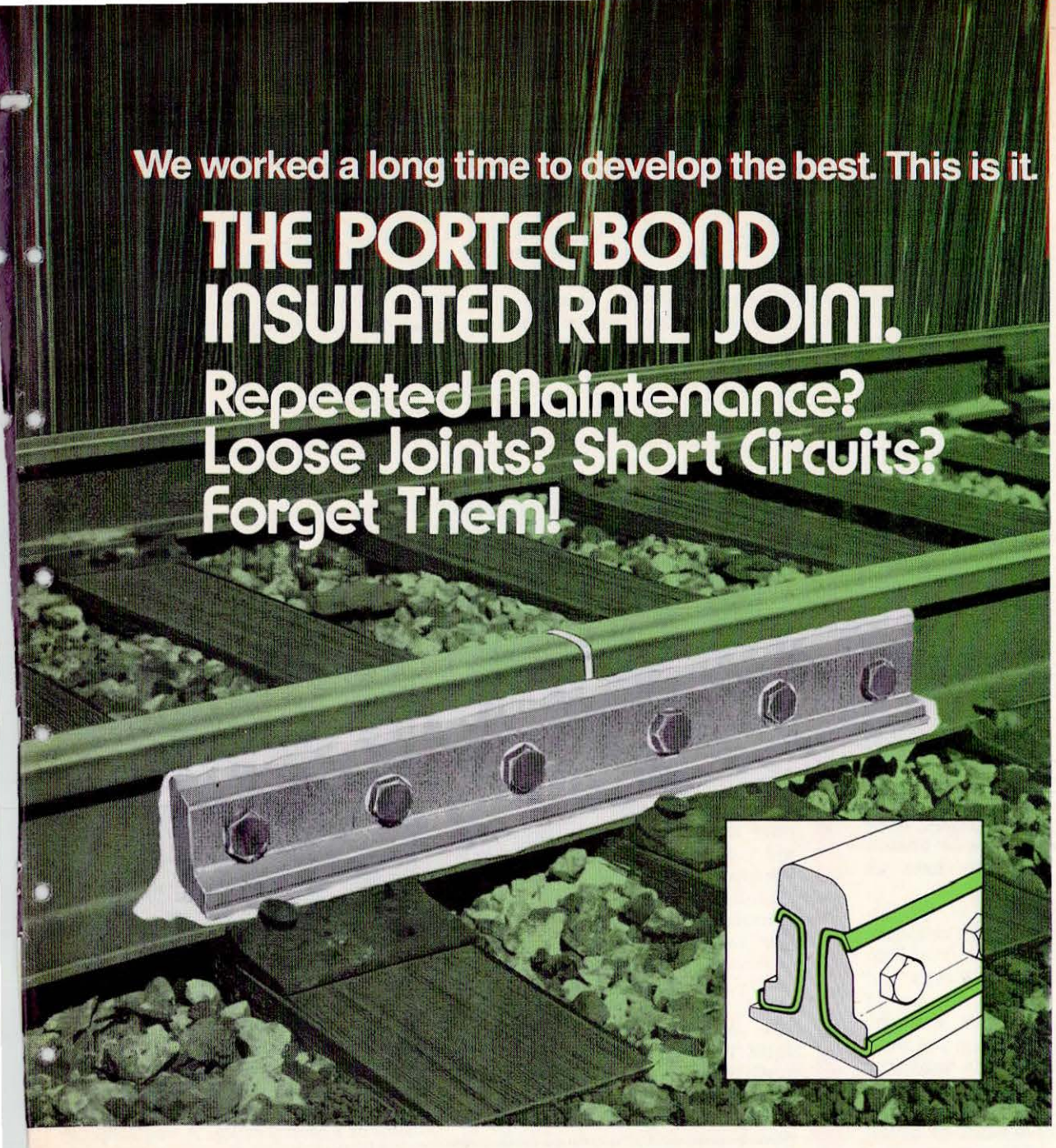
Removes sand from track in desert territory

Developed specifically to permit removing sand from track in desert operations is the Sand Blower, a machine produced by Railway Maintenance Corp. The Sand Blower, a modification of the firm's Hurricane Snow Blower, can also be used for snow removal.

Featured in the blower design is a series of filters, arranged in a special air intake to keep sand away from the jet engine, which generates the sand-blowing force. The main air intake for the jet engine has been positioned at the rear of the unit, as high as possible above the track, thereby further reducing the chance of sand entering the jet's system.

Also, part of the new design is a sound-deadening kit which substantially reduces the noise level in the operator's cab.

Circle 79 on reader service card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More than twelve years of technology have been invested in Portec-Bond® Insulated Rail Joints. The result? The best most advantage-filled bonded insulated joint system available anywhere, at any price. One key to its excellence is the adhesive . . . a product of free radical chemistry that eliminates 2-stage epoxy mixing, heating to speed curing, cooling and long traffic interruptions and delays. Complete in one kit, Portec-Bond Insulated Rail Joints require only proper rail end preparation as per supplied instructions. These joints can be applied in a matter of minutes, cure at 120°F and can handle traffic in about 10 minutes after curing. Pull-apart strength of a cured Portec-Bond Insulated Rail Joint is computed to be about 1-million lbs.

Portec-Bond Rail Joints are positively bonded joints that can't and don't loosen, that insulate completely and can be expected to last the life of the rail.

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Circle 15 on reader service card

C&S trend is toward simpler, sturdier,

One strong trend in the communications and signal equipment area is development of products that not only provide greater reliability, longer life and greater capacity but also cost less to install, operate and maintain. The increased productivity potential lies in a railroad's ability to make use of more communications and signal equipment, with a given manpower requirement, than was possible in former years, especially before the advent of integrated circuits and other solid-state electronics techniques.

Interestingly the effort to provide increased life, reliability or reduced maintenance is not always in the electronics area. For example, signal manufacturers now can provide aluminum instrument housings or equipment bungalows that are light in weight (hence easy to set in place) and require no painting. Union Switch & Signal, though, has introduced Cor-Ten steel instrument cases, which do not require painting, and because they are not silver in color (they turn a "rusty" brown with age but do not deteriorate), these Cor-Ten cases are not targets for hunters with rifles—who seem to have an affinity for silver.

● **Greater capability.** One of the features of recently-developed centralized traffic control systems of General Railway Signal, Harmon Electronics and Union Switch & Signal is the use of digital minicomputers. For example, Harmon's Novilog ctc system has been specifically designed to let a dispatcher or operator control a single console which may in fact be associated with many different code systems of different types and even different manufacturers. Any and all types of existing code systems "may very easily be tied together into one modern pushbutton console and the operator will not know or care where the borderlines are between the different older systems. The whole thing will operate in exactly the same way from his standpoint," reports Robert E. Heggestad, vice president and general manager of Harmon Electronics.

This is said to allow a complete modernizing of a control center with virtually no changes being made to any equipment in the field. The addition of the computer option provides a dispatcher with a means of doing all of his record-keeping automatically, eliminating manual train sheets, and eliminating the routine pushbutton operations to clear signals, unless there is a meet or specific unusual operation to be made. By tracking the progress of trains precisely throughout their run and being equipped to clear signals automatically, this system provides a basic groundwork for future expansion into a completely automatic dispatching system.

● **Electronics improves.** Greater reliability, longer life, and less maintenance are evident in much signal and communications equipment available today. Union Switch & Signal can provide solid-state overlay signal control systems which, used in conjunction with conventional dc track circuits, provide signal controls using the rails for transmission

Products for Productivity

Detector systems provide flexibility

Servosafe hotbox detector systems offer a wide variety of configurations and associated equipment to meet many operational conditions. The 8808 rail-mounted scanner is closer to the passing journals; ballast-mounted scanners are also available. Several modes of data readout are available: Automatic digital readout at trackside; display to the passing train crew; or remote readouts, such as pen-paper recorder charts in dispatcher's office, car foreman's headquarters or at a central location for inspections by supervisory personnel.

The rail-mounted 8808 scanner provides a more uniform scan of both roller and friction bearings. Other advantages include reduced installation costs, reduced power requirements, reduced maintenance and constant target-to-scanner relationships. Scanners and transducers, because they are mounted on the rails, move in unison with no shift in alignment with train presence and no need for realignment after ballast tamping operations.

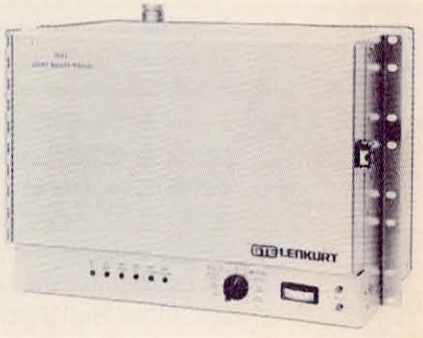
Circle 80 on reader service card

Vehicle scanner helps control TOFC yards

An automatic vehicle identification system (avi) is designed to remotely and automatically obtain data from passing automotive vehicles such as trucks and tractors, and trailers or containers hauled by them. Typical installations of the ACI Systems Corp. scanners are at entrance/exit lanes of railroad TOFC/COFC terminals. A key feature of the

avi scanner is its capability to be installed relatively near the roadway, yet maintain a 6-foot height of scan. The avi system can read the railroads' standard aci labels. Signals from scanners are sent to a label decoding processor which interprets, verifies and stores the data prior to transmission to remote locations or a central office. A single ldp can service the output from as many as six avi scanners.

Circle 81 on reader service card



Light-route microwave is a space saver

GTE Lenkurt's 70F1, 2-GHz microwave system features space-saving all-modular-designed radio transceiver using solid-state thick film and integrated

more reliable equipment

instead of line wires. Solid-state radar units eliminate the klystron vacuum tubes in retarder speed-control systems, thus extending equipment life, reliability and the maintenance costs of replacing vacuum tubes.

Modular-design and integrated-circuit techniques have been fundamental in providing lighter weight, greater channel capacity and simplified maintenance in railroad radio equipment. Motorola's Micor and WABCO's 4R series radios are examples of what these new electronic techniques have done to improve the products for the users. General Electric in its MASTR II line of two-way radio equipment has stressed integrated circuitry, resulting in greater circuitry that assures long-term reliability, good stability and low power consumption. This light-route, 36-channel radio was designed for spur and backbone systems in the 2100 to 2200 MHz frequency band. The user has a choice of a single-channel, hot-standby and space diversity arrangements.

Circle 82 on reader service card

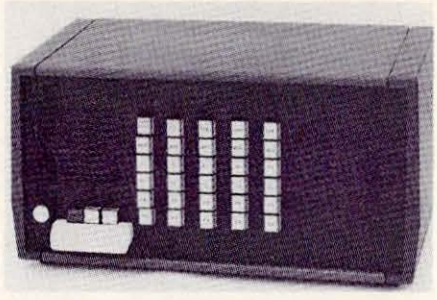
Large-capacity batteries handle larger C&S equipment

Two new, large-capacity nickel-cadmium storage batteries are the Edison ED-340 (340 amp-hr capacity) and the ED-400. An increasing number of signaling and communications applications now require larger capacity cells. These cells are designed for the newer types of equipment and services. Also, they have increased life for such services.

Circle 83 on reader service card

Dispatcher radio system controls 20 stations

The centralized dispatcher radio control system by Safetran provides the dispatcher with the ability to control up to 20 radio base stations per voice channel with 10 functions per station. Thus, the dispatcher can have instant two-way radio communications with moving trains, and all personnel along the right-of-way who are equipped with radio sets, provided they are within range of a base station. The dispatcher's console provides him with pushbutton, lighted controls for easy access and high visual impact. The dispatcher can have a separate radio control console, or his radio controls can be fitted into existing communications consoles or ctc control machines. Wayside and dispatcher's rack equipment fits standard 19-inch communications racks. The basic system is designed to operate within a voice channel.



Circle 84 on reader service card

Radio telephone weighs only three pounds

The real radio telephone is now in existence. Motorola has introduced a hand-held, completely portable push-button telephone which will allow the user to place or receive telephone calls from virtually anywhere in a metropolitan area equipped with the new DYNA T.A.C. system. This new Dynatac portable radio telephone will operate over radio frequencies and "talk" to any conventional telephone in the world. Pending Federal Communications Commission approval, Motorola plans to install the first Dynatac system in New York by 1976. Included in the Dynatac system is a computer which coordinates the operation of the portable phones and provides the tie-in with the conventional telephone network. The central computer will keep track of each portable phone in the system and select the specific base station transmitter and receiver which will provide the best message quality for each call.

Circle 85 on reader service card

Compact radio features modular, flexible design

The new 4R series WABCO radio features plug-in transmitter and receiver, and other key elements of plug-in design for ease of replacement and updating of the railroad radio unit to meet changing operating conditions. Power supplies are designed for use in locomotives, cabooses, urban transit cars, base stations, highway and m/w vehicles. The 4R series can be operated with up to 12 channels, making it ideal for runthrough train operation. Transmitter-receiver and power supplies are interchangeable with WABCO's earlier 3R series. Frequency range is 148-174 MHz, and rated

reliability both in terms of long-term performance and operation under adverse conditions. Modular design in all three—GE, Motorola and WABCO—provides for up to 12-channel sets, depending upon the particular brand. Such a feature is advantageous where run-through trains operate over several railroads. With these multi-channel radios aboard trains, a simple flip of a switch will put the radio onto the frequency assigned to the railroad over which the train is operating. This eliminates the need for switching radio sets when these trains move onto another railroad. Here is a time-saving and equipment saving-factor—again a means to increase productivity.

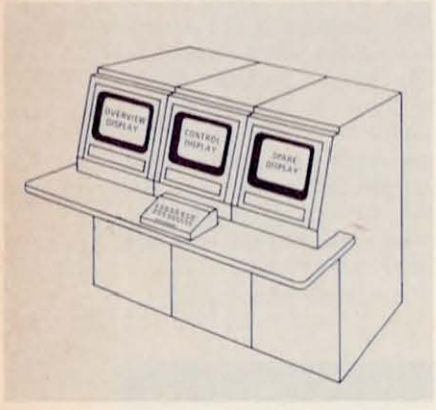
● **Less space, too.** These new and advanced electronic techniques have considerably shrunk space requirements for both signal and communications equipment. GTE Lenkurt has been able to reduce its type 46A3 600-channel multiplex system from 13 nine-foot-high by 19-inch racks into just three 11.5-foot-high by 19-inch racks, or four 9-foot-high racks. With floor space in air-conditioned offices going at $5 per square foot and upwards, this shrinkage in equipment is well worthwhile.

Similarly, the use of computers for

(Continued on page 64)

power output is 40 watts. The 4R unit measures 3.69 inches high, 10.63 inches wide and 16.13 inches long. Weight is 23 pounds.

Circle 86 on reader service card



Color tv aids ctc dispatcher

The latest version of the computer-oriented Traffic Master II centralized traffic control system features crt displays in full color to enable the dispatcher, at a glance, to ascertain track occupancy, routes lined and signal aspects displayed. This General Railway Signal Co. development has been in service in a black-and-white version, but the color system will be shown for the first time at the Communication & Signal Section, AAR, annual meeting in New York. Traffic Master II combines the principles of pushbutton control with the high speed and volume processing capability of a digital mini-computer.

In addition to applying Traffic Master II to centralized traffic control territories, one major railroad is using the system for consolidating control of several interlockings in a terminal area.

Circle 87 on reader service card

Crossing protection uses digital techniques

In a move to provide rail/highway grade-crossing protection equipment

that has lower installation and equipment costs as well as lower maintenance costs, Harmon Electronics provides complete electronic control systems, warning devices and complete packaged systems. One of the most recent developments in grade-crossing safety devices is the digital motion detector which combines new concepts in train detection with state-of-the-art techniques in electronics to provide an effective stand-alone system to detect approaching trains from a single location at the crossing. Use of this type of control will minimize the amount of engineering and wiring and other devices required to control even a fairly complex crossing layout.

Circle 88 on reader service card

Crossing signal brackets meet AAR and OSHA rules

The new Western-Cullen "walkout" cantilevers for locating flashing-light signals over highway lanes at railroad-highway grade crossings meet AAR and Occupational Safety and Health Administration standards and requirements. Constructed of aluminum and stainless steel, the "walkout" cantilevers are available in sizes from 8 feet to 40 feet. These cantilevers permit light units to be adjusted without interfering with highway or rail traffic. They can withstand winds up to 100 mph with a 30% safety factor, and will support 500-pound live load at the tip.

The cantilever allows a normal 17-foot roadway clearance. The walkway is available in two types of non-slip safety grating to meet state and OSHA safety standards. A special anti-climb guard on the ladder prevents vandals from climbing the cantilever. The W-C walkout cantilever will accept crossing signal accessories such as flashing-light units, crossing signs, warning bells.

Circle 89 on reader service card

Jointless track circuit has solid-state elements

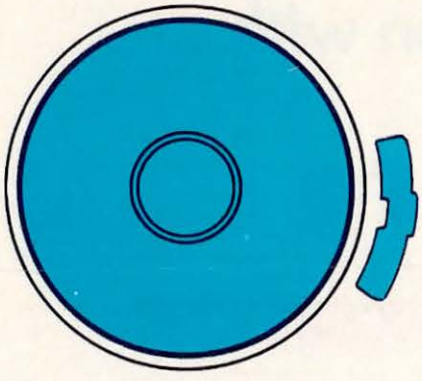
WABCO's SSJ-10 solid-state jointless track circuit provides a means of detecting trains, providing broken-rail protection and providing communication between head block and/or automatic signals eliminating insulated joints. Operation is similar to a 4-wire signal control system without line wires. The system provides for normal train separation, following moves and two-direction running.

Circle 90 on reader service card

Teleprinter moves data at 1200-baud rates

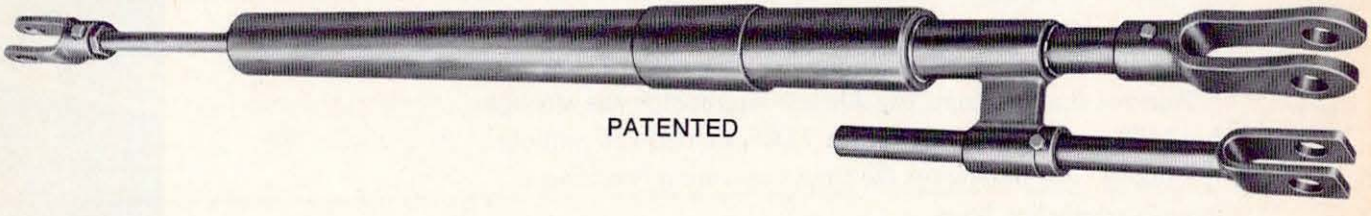
The new TermiNet 1200 printer can reduce operator and line costs in the movement of data over communications lines. General Electric's TermiNet 1200 prints 120 characters per second and transmits data at 1200 bits-per-second rates. Terminet 1200 will operate over public phone lines or railroad-owned communications channels.

Circle 91 on reader service card.



6 ways

UNIVERSAL 1900-DJ SLACK ADJUSTER WORKS FOR YOU...



PATENTED

1. Adjusts slack or clearance between brake shoes and wheels on all types of cars. As shoes wear, the adjuster automatically shortens. As new shoes are applied, the adjuster automatically lengthens.
2. Maintains proper piston travel at all times, automatically adjusting the brakes to operate within the most acceptable piston travel range. No manual adjustments are necessary.
3. Withstands stresses encountered by freight cars under all conditions of service.
4. Its performance is service-proven. The finest materials, engineering know-how and workmanship, coupled with its unique cone clutch mechanism, have made the 1900-DJ Universal slack adjuster a reliable performer.
5. Offers economy and long life. In a foundation brake rigging properly applied to a car, the 1900-DJ will operate for many years with a minimum of attention.
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Nordberg®
railway equipment

1080 anchors per hour for 33% more production with...

New Nordberg® Anchor Applicator

Here's one for the road, designed to save time, labor and costs—and boost production up to 33%.

The new Nordberg Anchor Applicator has a great track record applying two anchors at once for a securely boxed tie—up to 1080 anchors and 540 boxed ties per hour.

Each work cycle is fully automatic from initiation by single operator—sequenced by a solid-state logic system with manual override for all functions.

And for the long run. The Anchor Applicator has storage for 1100 anchors—enough for a 1440′ welded rail without reloading. This minimizes the time-consuming handling of individual anchor bags.

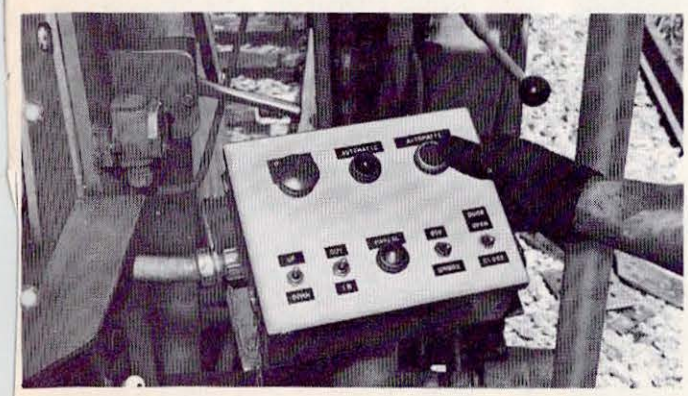
Get complete information on the Nordberg Anchor Applicator readily adaptable for all popular makes of anchors. Contact Nordberg Railway Equipment Division, Box 383, Milwaukee, Wisconsin 53201.

Rexnord
Nordberg Machinery Group

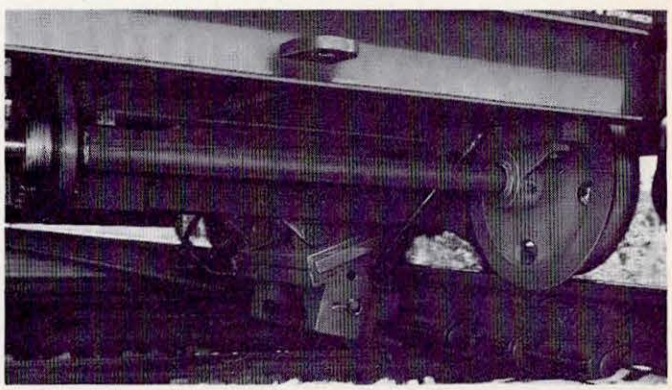
Circle 17 on reader service card

Nordberg Anchor Applicator is designed so anchors are conveniently located within the operator's reach for quick, easy loading into the feed chutes. Stores 1100 anchors—on board.

R573



Solid State Logic System. Entire work cycle is automatic after actuation by operator for work rates up to 18 anchors and 9 boxed ties per minute.

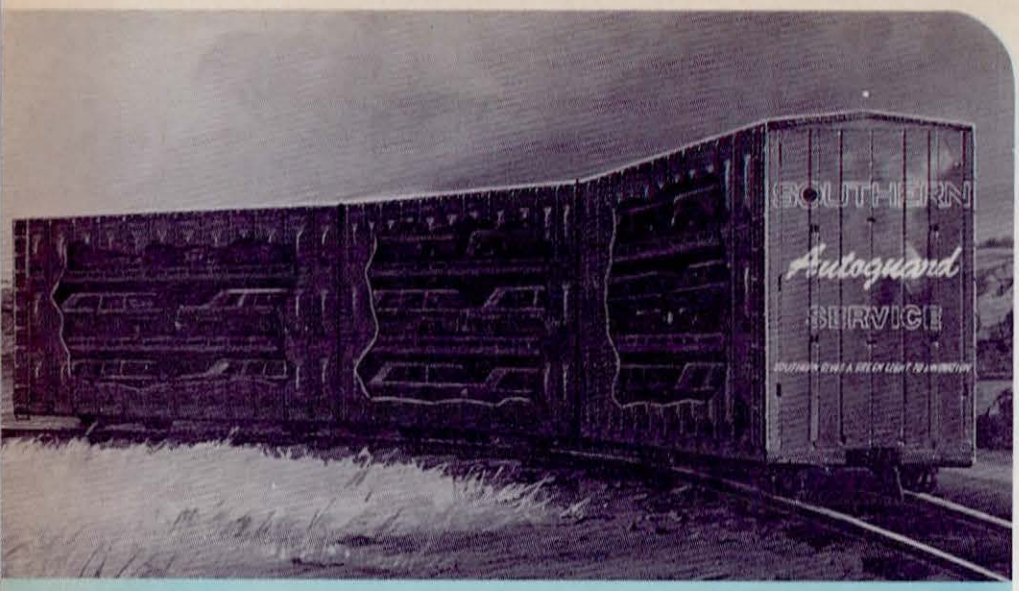


A 47 h.p. diesel engine provides power for a smooth hydraulic system with up to 40,000 lbs. of application force for securing two anchors at once—or only one anchor.

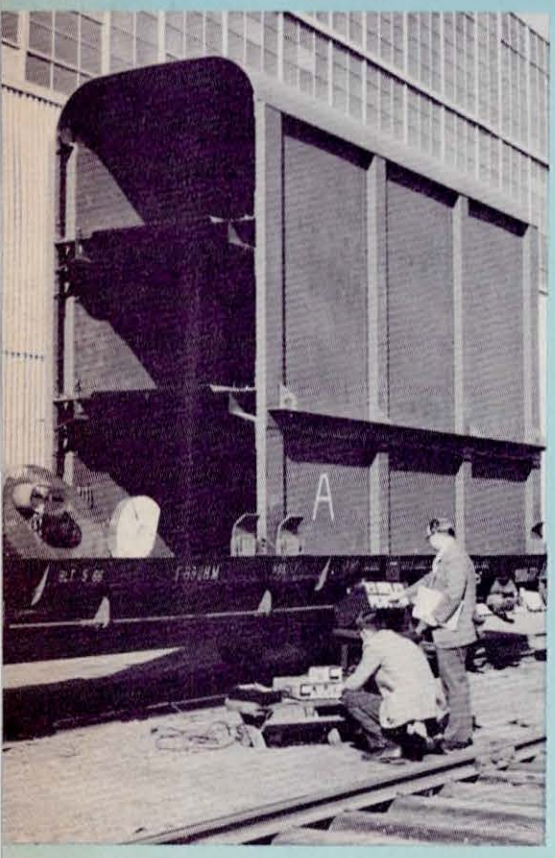
Beating the

The constant search for more efficient freight-carrying and freight-hauling equipment must be a cooperative effort of railroads and their suppliers. For it to be otherwise can lead only to development of solutions for which there are no problems—or, more probably, of inadequate solutions for problems which have been improperly or incompletely defined.

Only recently has it become legitimate for a supplier to ask a railroad customer: "Exactly what do you want to do and what are the constraints on

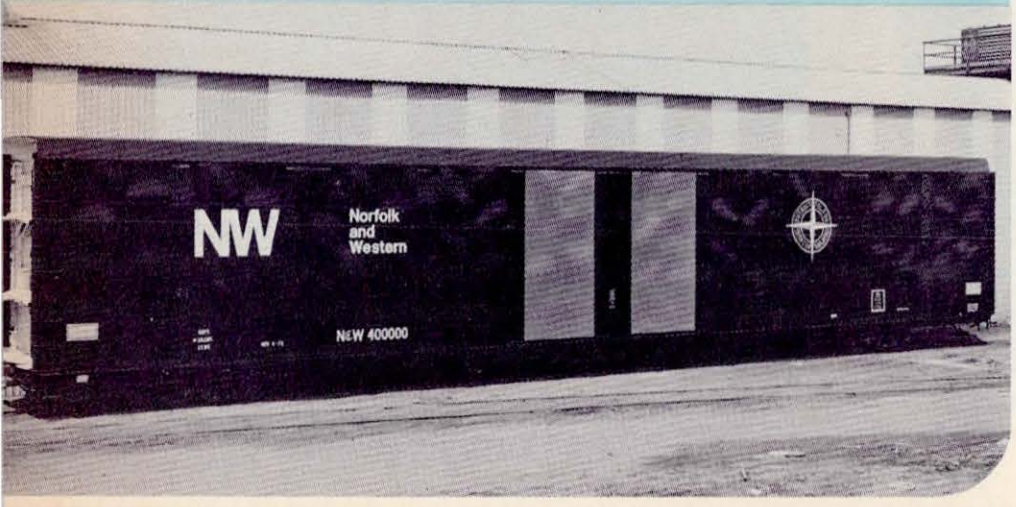


AUTOGUARD design and appraisal involve cooperative efforts of suppliers, builder, railroad and auto makers. Southern is releasing the three-unit car for experimental service as soon as its own road testing has been completed.

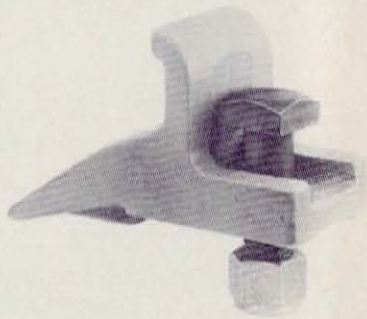


STAC-PAC, such as this unit being perfected by Stanray, is container used in rail transportation system chosen by General Motors for all of its standard-sized vehicles. Four Stac-Pacs are carried on a standard 89-foot flat car.

SNAP-PAK, a totally enclosed 89-foot vehicle developed at behest of Ford, is to permit automated loading and unloading. Prototype car development involved builder and five railroads that participate in the handling of Ford's automobile traffic.



Products for Productivity



Side frame key features hold-on leg

An AAR-approved side frame key, available as a single unit or in complete kit form, features a vertical "hold on" leg which provides more positive roller bearing retainment. This MacLean-Fogg product is designed to transmit the bearing journal force to the inner pedestal of the side frame, not to the bolt. The side frame key locates in the frame easily, with the bolt merely dropped in and locknut torqued.

Circle 92 on reader service card

Single-conductor cable for car applications

Single-conductor locomotive and car cables insulated with chlorosulfonated polyethylene conforming to AAR specification are available in a range of conductor sizes from No. 16 AWG through 1111 MCM from General Elec-

odds in rolling stock design

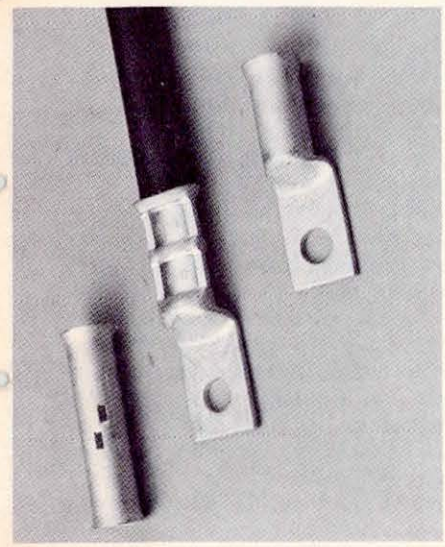
doing it?" Finance and marketing are two that immediately pop into mind—but there are the constraints imposed when American railroading chose to become an integrated, standardized industry a century ago.

The ingenuity of equipment suppliers is constrained by a track gauge that is obviously less wide than desirable in the light of current conditions but was more than adequate for the speeds and loads of a century earlier. The standard coupler height, the universal clearance diagram and other dimensional limits tend to produce uneconomical engineering compromises in the design of rolling stock and rolling stock components. The economic reality of long-train operation imposes on the equipment designer the need to produce every vehicle of sufficient strength and resilience that it can be operated reliably and safely at any point in the longest, heaviest train that might be assembled anywhere in North America.

● **Raise the bridge or lower the river?** In the constant drive for great weight-carrying ability or greater volume in individual units, railroads have accepted heavier axle loadings, higher centers of gravity and greater overhead clearances that, in turn, have had ramifications far beyond rolling stock. Certainly longer, heavier cars have had their effects throughout the industry—in track wear, in hump yard design, and in train operation. Even in rolling stock design, many research activities are today directed at overcoming problems resulting from prior designs. The improved snubber is necessary in a coal car which has too high a center-of-gravity

tric. The 600-volt cable has temperature ratings of 90 deg. C for dry locations and 75 deg. C for wet locations. These cables, the SI-58798 type, were developed for wiring and rewiring of power and control circuits in locomotives and transit cars. To facilitate insulation stripping, a separator tape is applied over No. 5 AWG and larger conductor sizes. The Hypalon extruded insulation has a high degree of flame- and oil-resistance, not requiring a jacket and making the cables easier to handle during application. A 1,000-volt version of the cable is available.

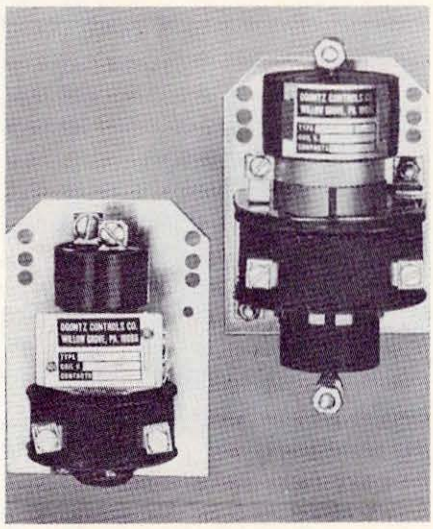
Circle 93 on reader service card



Terminals, splices designed to speed repairs

For emergency cable repairs, where speed is essential, Ampower terminals and splices are available with long wire barrels. The long barrel is more tolerant of crimp location and cable preparation, permitting faster work with standard tooling. Although, according to AMP Special Industries, a single crimp is adequate, the wire barrel is long enough to permit an additional crimp in critical circuits. Terminals and splices accommodate standard, solid or a combination of conductors.

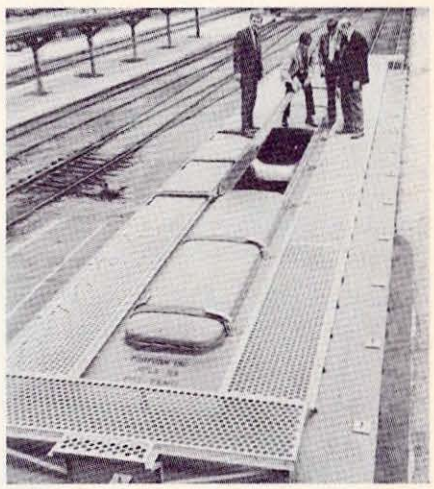
Circle 94 on reader service card



Sealed relay prevents contact welding

A hermetically sealed Mercury Plunger Contactor eliminates the need for contact cleaning and avoids the possibility of contact welding. The Ogontz Type 632 contactor consists of an electrode mounted in a ceramic-lined stainless steel cylinder partially filled with mercury, a plunger floating in the mercury and an external coil. Activating the coil moves the plunger down, displacing the mercury until it contacts the electrode. An inert pressurized atmosphere suppresses arcing. The relay is fast cycling and designed for a life expectancy of 5 million operations. Three types handle 6 kw (overhead heat) and 12 or 18 kw (floor heat).

Circle 95 on reader service card



ICG tests top for topless cars

Seeking greater flexibility for its 10,500-car open-top hopper fleet, Illinois Central Gulf is experimenting with a removable fiberglass roof which can convert the coal car to other uses—hauling wheat, corn, soybeans, and maybe fertilizer. Manufactured by Proform, Inc., of Minneapolis, the prototype top weighs about 3,000 pounds, and is secured to the coal car's top chord using L-bolts.

The particular top ICG is experimenting with, on its Iowa Division, is 50-foot, 6½-inches long and 10-foot, 8-inches wide. The centerline hatch is 42-foot, 2-inches long and 26 inches wide. If mass-produced, Proform feels it could deliver the tops at a cost of

because the railroad industry can see no way to get its customers to install longer car dumpers that would, in turn, permit building longer cars that would have a lower center of gravity to begin with.

● **Customers have clout.** Transportation of new automobiles is a case in point. For about a decade the installation of a relatively inexpensive rack on a piggyback flat car produced the bi-level and tri-level rail vehicles which enabled U.S. and Canadian railways to capture fully half of the movement of new automobiles. With revenues edging toward $600 million last year and loss-and-damage payouts approaching $35 million, auto makers have served notice that their products are not going to continue to ride the rails exposed to vandalism, theft and the elements (RA, June 25, p. 42).

Side shields on rack cars have been a temporary palliative. But there is increasing evidence that a completely closed car will be required.

Southern Railway has been working with Greenville Steel Car to produce a three-unit, articulated and totally enclosed auto transporter scheduled for delivery this month. Named "Autoguard," the car is designed to achieve the lowest possible unit cost of transporting automobiles and to solve the principal loss and damage problems.

Two prototypes are to be delivered. Both in appearance and design, the new enclosed car resembles the experimental hopper car which Southern developed in cooperation with Aeronca in 1965 for possible use in unit coal trains. Because of articulation, the length is not limited to 89 feet 4 inches, as is the case with any individual car currently built.

"Of prime importance to automobile manufacturers, dealers and railroads alike," says Southern, "Autoguard provides complete protection both from the elements and from vandalism and theft." It is capable of carrying 50% more autos than the largest single-unit car now in use.

Sides and roof are high-tensile steel. The ends consist of full-width tri-fold sliding doors which fold into pockets in the car sides, allowing easy access to all three levels of the car simultaneously. The door may be opened or closed by one man on the ground; once shut, it may be sealed or padlocked to assure against any unauthorized entry. "Dollar savings to the automobile companies and railroads due to a reduction of theft and vandalism are certain to be substantial," says Southern. "There will also be important dividends of added dealer and customer satisfaction resulting from dependable on-time delivery of vehicles free of loss or damage."

Autoguard has an inside length of 124 feet. It can carry 18 full-size autos, compared with the 12 which fit on a standard tri-level rack car. "To the automobile manufacturers, as well as to those who purchase their cars, the increased capacity means that there is the potential of offsetting a major portion, if not all, of the increased capital cost with the improved carload revenues, while holding the line on per-automobile cost," explains Southern.

Because articulation permits cars to be constructed to AAR's maximum outside width of 10 feet 8 inches, usable inside width is a full 20 inches greater than with previous auto-carrying freight cars. In addition, the articulated design—with single-axle trucks at the ends of each unit, plus long-travel springs—enables the new car to negotiate sharper curves than the present standard and to provide superior vertical riding characteristics, including greater stability.

Southern says Autoguards are designed to last up to 20 years, compared with 10 years for rack cars. It thus could be phased into present fleets as bi-levels and tri-levels are retired. All this would be without costly modifications of handling facilities by auto makers and railroads.

After a short period of testing by Southern technical personnel, the two prototype cars will be released to auto makers for such field testing as they feel necessary. To be checked at this phase will be loading, unloading and movement in trains.

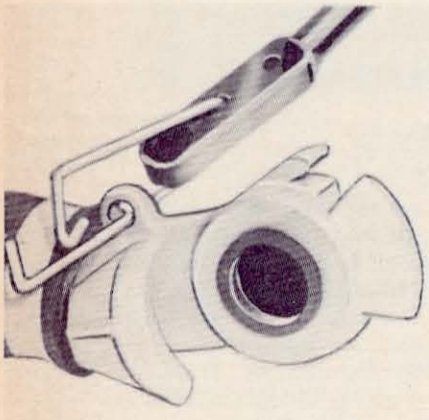
This approach to auto handling came close on the heels of Ford-sponsored Snap-Pak, an enclosed 89-foot vehicle

(continued on page 70)

$2,400 to $2,500 each.

D.L. Henderson, ICG's director of marketing-food and farm products, says the tops are designed to store easily when not needed, and since they are made of fiberglass they will not deteriorate quickly if stored outside. He estimates that ICG could put 200 to 300 tops in service year-round starting now. Although numerous loads of wheat, soybeans and feed grains were moved unprotected in open-top hoppers during this year's grain-car crunch, several state agricultural departments have made it known they will be insisting that some type of protection be provided for future grain shipments in open-top cars.

Circle 96 on reader service card



Hose support minimizes train partings

The Hollamer air hose support, made from a tough, resilient elastomer, has AAR approval for interchange service. It was designed by Holland to minimize air hose partings, taking the place of the standard S-hook and snapping back from a force that would open the conventional hook. The support is impervious to all petroleum products and most chemicals, continuing to function at minus 60 deg. F. One man without tools can attach the strong, spring-steel clips in seconds in the field.

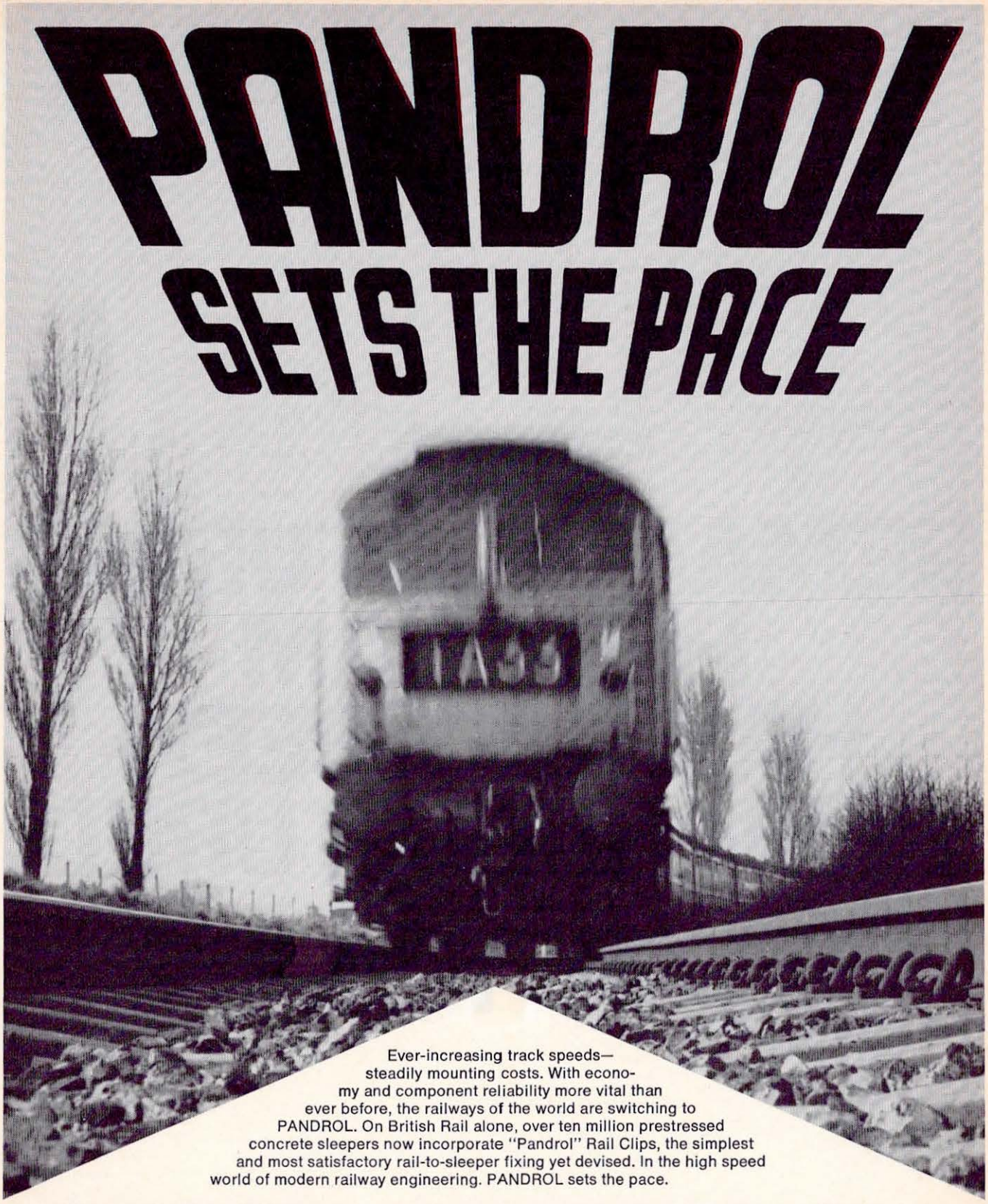
Circle 97 on reader service card

Speed indicator assures safer train control

A compact, solid state unit that provides accurate speed-at-a-glance readings in a modern digital display, the Mark IV Digital Speed Indicator enables more efficient and safer operation of freight trains and commuter and rapid transit vehicles. Easily installed in the cab of the vehicles, the new Vapor Corp. speed indicator features integrated circuitry, easy to read numerals of uniform brightness and glare-free curved lens for clear readouts. The Mark IV displays speeds up to 99 mph.

Circle 98 on reader service card

PANDROL SETS THE PACE



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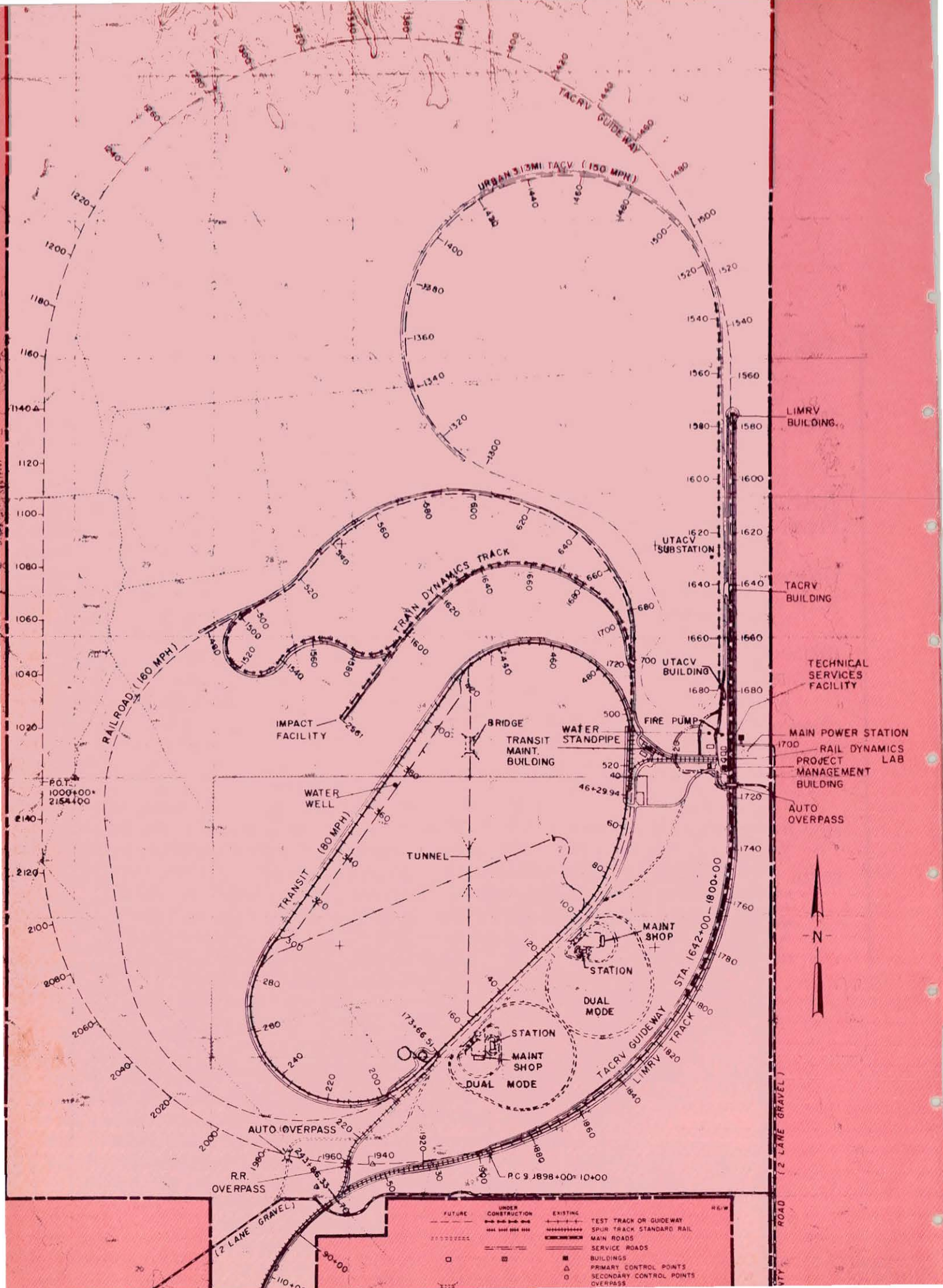
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Pueblo promises big boost for rail R&D; the question is when

By ROBERT D. BARTLEY,
Associate Editor

For those railroads, equipment suppliers and transit-system operators who have been looking longingly toward the Department of Transportation's High Speed Ground Test Center in Pueblo, Colo., for technical help in overcoming some of their safety, mechanical and operating problems, the word for them at the moment has to be: Patience.

Make no mistake about it, help is surely coming from this $80-million test facility. But it's still several months off, perhaps years off for some phases of much-needed testing of ground transportation system components, especially the ones related to conventional rail.

At the present time, the 30,000-acre test center is, for the most part, a construction site, with by far the greatest evidence of "ground transportation" being the earth movers, side loaders, scrapers, dump trucks and mobile cranes being used to build the place.

Reached by driving nearly 15 miles north off Route 96 east out of Pueblo over a stretch of spring-busting back road which Test Center employees have dubbed the "Burma Road," the 5½- by 9-mile site still belongs to nature. The gently rolling semi-desert where someday the nation's—maybe the world's—most advanced ground transportation vehicles and components will come to be tested is heavily populated with rattlesnakes. Roaming coyotes are a common sight, antelope mingle freely with cattle grazing on test center property, it is home for a large settlement of edgy prairie dogs. And overseer of it all is a lone bald eagle that's regularly seen circling overhead.

Although only limited testing has actually been conducted at the HSGTC, there's still plenty of activity there, with much of it centering around the construction of test tracks and buildings to house precision testing machinery, computers and other support equipment.

● **FY'74 budget: $20 million.** Approximately $20 million has been budgeted for the test center in FY 1974, with the Federal Railroad Administration providing three-fourths of that amount and the remainder coming from the Urban Mass Transportation Administration. The $20 million covers all activities and expenses at the test center, explains Milton Klein, associate FRA administrator-research, development and demonstrations. By "everything," he means all test projects, new construction, special test crew salaries, maintenance, supplies, and so forth.

Perhaps the greatest concentration of activity is at the site of the $15-million Rail Dynamics Laboratory, located adjacent to the center's Project Management headquarters. Under construction since July 1972, the lab is expected to be ready for service on a limited basis early next year and in full operation by August 1975. The general feeling is that, once the lab is in full operation, this will be the signal for long-awaited test projects related to conventional rail freight and rapid-transit operations to start gathering momentum.

The lab's dominating feature will be its wheel/rail simulator, composed of drive trains, carriage assemblies and structures, wheel modules, cranes and control equipment. This advanced testing system will be able to create in a closely-controlled laboratory atmosphere a wide variety of normal and, of course, abnormal, track conditions.

It will be at least two more years before testing starts in earnest at the DOT facility

Some of the simulator's components—such as the drive train assigned to General Electric for design work and assembly, and the roller rigs for which Gulf & Western earned the contract—are moving along toward the hardware stage. Meanwhile, the contract for another of the simulator's major components—the carriage assemblies—was assigned recently to The Boeing Co.

Jointly funded by FRA and UMTA, the Rail Dynamics Lab will be a versatile facility in that it will handle testing of both rail freight and conventional rapid-transit vehicles, plus other more exotic vehicles, some of which are already on the HSGTC property. The simulator will be capable of creating a wide range of track conditions—up to three degrees superelevation, expandable to eight degrees, with a minimum 100-foot simulated radius. Also, it will have the capacity to handle vehicles up to 180 feet long, 20 feet wide and 26 feet high. Speeds up to 285 mph and weights of 600,000 pounds will be tolerated briefly under certain testing conditions.

● **Low- and no-speed, too.** "The name—High Speed Ground Test Center—may be a misnomer," says Klein: "We certainly plan to do a lot of low speed and no-speed testing there." Fore example, he adds, the early test activity in the new laboratory will center on static testing of freight car trucks. A shaker table will be installed for vibration tests of the trucks. Later, a Metroliner truck will also be tested—in the lab and perhaps on the conventional test track, too. And, the test agenda shows that a highly instrumented truck test is planned for the dynamic loop of the conventional rail system at the test center.

FRA officials are about as anxious as anyone to see the lab and the special tracks designated for rail freight vehicle tests go into full operation. Although he is not displeased with the data retrieved from the rather limited research that has taken place thus far, Glenn A. Reiff, director of the test center, wants to see a greater volume of testing and is looking forward to the day "when, hopefully, all new ground transportation vehicles will be coming to Pueblo for testing."

The groundwork is already being laid to secure participation of railroads and equipment suppliers in test projects at the HSGTC. Federal Railroad Administrator John W. Ingram has asked both the Association of American Railroads and the Railway Progress Institute to provide liaison personnel to work closely with test-center personnel on projects of mutual interest and benefit.

FRA's Klein says that he hopes his department will be able to make an early selection of liaison personnel from the lists of names furnished by the AAR and RPI. He is quick to point out, however, that while the persons chosen for this key assignment will be important links in the communication lines between the three organizations, they will not replace ways and means for information exchange that have already been established and are working well.

● **Wants cooperative programs.** When it first established the objectives of the HSGTC, DOT let it be known that it wished to encourage use of the center by non-Federal organizations, such as railroads and the railroad supply industry. Regarding the relationship between

DOT will encourage use of Pueblo's facilities by foreign as well as U.S. railroads and equipment suppliers

the test center and industry programs, the DOT directive said:

—For programs involving government R&D interest the financial and staffing arrangement shall be determined on a case-by-case basis by the operating administration involved. The required staffing will be patterned after the arrangements for DOT-sponsored projects.

—For programs involving proprietary data, or one in which the government has no R&D interest, the user will pay fully-allocated cost of test operation, including use charges. The user will not be required to supply the government a copy of the final data results. The user will, however, have to supply the test center with sufficient drawings and analysis to assure safety compliance. In turn, he will not, under any circumstances, be permitted to advertise that his product has undergone testing at the test center in such a manner that the recipient is left with the impression that the government either endorses the project or is privy to the test results.

In addition to the railroads and their suppliers, DOT also wishes to encourage foreign countries to make use of the Pueblo facility. Guidelines similar to those set for the railroads and suppliers have also been established for foreign programs.

The AAR has several research projects, including its far-reaching Track/Train Dynamics study, portions of which it would like to see move into testing stages at the HSGTC. Some of these projects already have FRA and RPI support, but would stand a better chance of producing benefits if a facility such as the Rail Dynamics Lab should become available for precision testing.

Aside from the vibration tests on freight car trucks which will be conducted in the lab, other "early activity" tests related to conventional rail which should be producing test data in 1974 are ones concerning grade-crossing safety and locomotive cab integrity. The conventional rail test oval was designed with a built-in impact track where grade-crossing collisions could be staged and studied. Before the end of 1974, FRA hopes that high speed tests of locomotives will also be under way.

The conventional rail freight and rapid-transit tracks at the HSGTC, as well as the futuristic guideways (see p. 42) will be undergoing considerable examination and testing themselves, although perhaps not as much as the vehicles that will be sent there. Approximately six miles of the conventional train dynamics track and 3/4 mile of its associated impact track are completed at the site. These two test track sections are made of 136-pound CF&I rails, all bolted, with Portec rail anchors. The wood ties, on 19½-inch centers, were furnished by Baxter. CF&I also supplied the ballast for this particular project.

FRA elected to use bolted rails so that, should researchers wish to alter the tracks for unusual experiments, these changes could be made much more easily than with welded rail. Also, the track designers chose to stay with wood ties, but left the door open for experiments later using concrete ties. "Since we have the Kansas Test Track, where concrete and steel ties can be tested extensively," advises Ross Gill, staff engineer at the Pueblo site, "we felt we could carry out our testing here using wood ties almost exclusively."

● **Conventional rail oval for 160 mph.** Shortly, work is to begin on the construction of the 14-mile conventional track oval on which high speed—160 mph—tests will be run. It's planned that this track will be used to test self-powered commuter cars as well as freight train vehicles. Critical grades and curvatures will be built into this oval and it's expected that tests involving derailments, collisions, track-buckling, grade-crossing trials and tank car accident investigations will be conducted on it. Studies of the lateral displacement of track and of the effect of poor track on rolling stock are among the near-range projects now being planned, Klein reports.

One of the big advantages of having the test center where it is—on the plains just east of the Rockies—is the weather extremes and rugged environment that are encountered there. The 52.6-square-mile area, acquired via a 50-year renewable lease, is owned by the state of Colorado (95%), private interests (4%), and the Federal Bureau of Land Management (1%). It is generally dry with annual precipitation averaging 12 inches and with the average daily temperature ranging from 15 degrees in winter to 92 degrees in summer. Some areas of the test center have a problem with windblown sand, making it necessary to engage in soil stabilization programs to keep testing tracks clear. All in all, the site will give researchers an opportunity to test vehicles in ideal as well as poor conditions.

● **Rail installations being stepped-up.** The conventional rail oval is scheduled for completion in mid-1974. Meanwhile, the 9.2-mile rail transit loop, completed a year ago, has been in limited service in testing R-42 transit cars and the SOAC passenger vehicles. These vehicles require wayside electrical power, and since commercial power won't be available at the site until probably mid-1974, a GE U30C has been serving as the electrical energy source for tests on this oval. A two-mile siding for the transit track is now under construction with a completion date of December 1973. Another track, associated with the transit track and on which tunneling will be featured, is scheduled for completion a year later.

● **First, a catch-up exercise.** There's little question but what the HSGTC is going to exert a tremendous influence on the direction non-motor-vehicle ground transportation will be taking in the years ahead and on the pace at which new developments will advance to the point where the general public will benefit. First, though, a lot of technical catching-up is needed. Or, as noted by one test center engineer who had been associated with aerospace technology for many years: "It's fairly clear to us that ground transportation needs the luxury of a lot of R&D."

Pueblo's transit role

While the Pueblo facilities will be heavily oriented toward R&D in line-haul, freight railroading, the major publicity so far has gone to Pueblo's role in passenger transportation—in terms both of improving existing urban and intercity transportation as well as testing whole new concepts. Passenger transportation's role at Pueblo may have been over-emphasized in the general press, but it is nonetheless an important one.

Test programs under way or scheduled at the HSGTC include:

—**The Linear Induction Motor Research Vehicle (LIMRV).** Currently operating on six miles of standard-gauge railroad track (actually, it's standard gauge plus 1/8-inch), this test vehicle is undergoing a few major changes which should enable it to not only break the world's speed record for steel-wheeled cars (205.85 mph) but also to continue to reach speeds of close to 250 mph. In its initial series of tests, the LIM-powered research vehicle reached a maximum unmanned speed of 191 mph. To attain the higher speeds planned for it, the vehicle is being fitted with a pair of J52-P3 jet engines which will add 12,000 pounds of thrust. As envisioned by the engineers at the test center, the jets will provide the initial impetus to get the vehicle up to the 250-mph mark at the 2-mile point along the 6-mile track, and then the LIM will carry through from there.

The LIM itself is being beefed up somewhat for this second series of tests, and the vehicle's disc brakes (one of five

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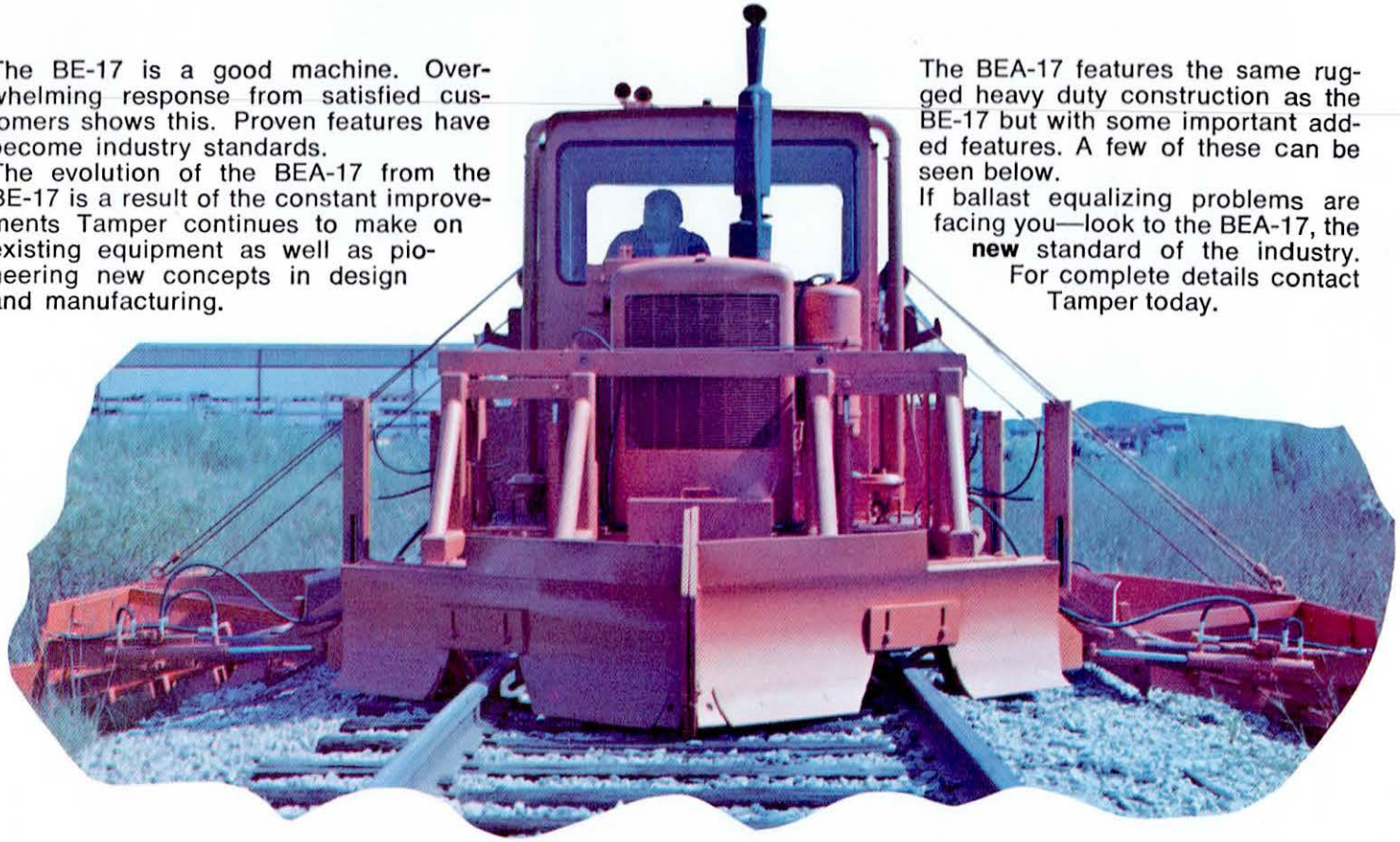

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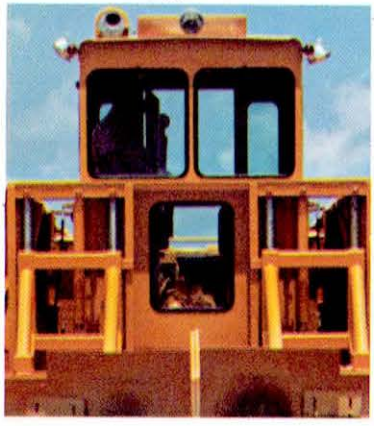

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Transit's future takes shape at Pueblo

braking systems which will be employed) are being given more heft—30 inches of braking surface per disc versus 26 inches in the original test series. Other braking systems which are used include: (1) aerodynamic, which is activated first; (2) dynamic braking off the LIM; (3) the disc brakes; (4) a braking parachute; and (5) an arresting system at trackside at the end of the run.

It should be remembered that the LIMRV, as well as other vehicles at the HSGTC, are there for research and testing purposes and don't represent the type of hardware which will appear on intra- or inter-city public transportation systems at some point in the future.

Actually, the LIM is a very quiet form of propulsion, and in all likelihood, when made part of a public system it will draw electric power from a wayside system. At the Pueblo test center, however, a jet engine is the energy source for the LIM, and when the LIMRV goes whooshing down its test track, prairie dogs scurry for their burrows.

The LIMRV project, started early last year, has about another 1½ years to go before it is completed. At the moment, there are no plans for installing wayside power along this test track. Meanwhile, as this test project continues toward completion, researchers are turning their thoughts to the SSLIM.

—Single-Sided Linear Induction Motor (SSLIM). Once considered too inefficient for any practical application, the SSLIM has suddenly gained some proponents, and is considered a real challenger for the LIM (which, for clarification purposes, might be called a DSLIM, for double-sided LIM). Researchers at the test center are hopeful that an SSLIM test program will be able to get under way by mid-1975. First of all, though, a flat aluminum reaction rail will have to be installed in a section of test track. Unlike the LIM reaction rail, which is 22 inches high, the flat SSLIM reaction rail fits comfortably between the track rails, thus permitting operation of standard passenger and transit cars as we know them today, if that is what's desired. Furthermore, simple switching is possible with the flat reaction rail, but not so with the 22-inch reaction rail sticking up between the track rails.

Although it shows great promise, the SSLIM is not without its problems. For one, debris and other foreign objects could become lodged between the reaction rail and the LIM and interfere with the vehicle's operation. This is something the engineers know full well that they will have to give a lot of though to during the test series.

—Tracked Air Cushion Research Vehicle (TACRV). A newer program than the LIM project, this one has been somewhat limited in scope thus far due to the relative shortness of the test track and the lack of wayside power at the HSGTC. Eventually, the oval track for this test project will be 22 miles in lenght; at the moment, however, only 2 miles are installed, with another mile scheduled to be in sometime this fall.

LINEAR INDUCTION MOTOR vehicle was among first tested at Colorado site.

When commercial power becomes available—probably about mid-1974—the TACRV program will move ahead at a much more rapid pace. The engineers are looking for speeds up to 300 mph from this vehicle. Tests conducted thus far have been made at relatively low speeds—110 mph maximum. The 3JT15D fan jet engine in the vehicle has been supplying not only the air for cushioning and guidance but also its propulsion. Eventually, a LIM will be used for propulsion.

Researchers are looking as long and hard at the guideway for the TACRV as they are at the vehicle itself. This research guideway is steel reinforced with pre-stressed side panels capable of withstanding loads imposed at 300 mph. The basic U-shaped guideway is 12 feet wide and five feet high, and is being assembled with a tight tolerance of only 1/8 inch per 25 feet.

—Urban Tracked Air Cushion Vehicle (UTACV). Built by Rohr, this 60-passenger vehicle is expected to make its initial appearance at the HSGTC this coming fall. Unlike TACRV, this unit features an inverted T-shaped LIM reaction rail which will double as the vehicle's guidance system, thereby eliminating the need for sidewall guideways. HSGTC hopes to have one mile of a 7-mile guideway for this vehicle ready when it makes its appearance soon. This single-surface guideway will consist of a basic concrete slab with an asphalt veneer.

The vehicle itself has a real international flair to it—the suspension is of British design, the propulsion is French and the seats are of Brazilian manufacture. It is designed for intercity operation, or for shuttle service between city centers and their airports, with a maximum attainable speed of 150 mph.

—State-of-the-Art Cars (SOAC). Built last year to demonstrate the best of current, off-the-shelf technology, these two cars had been undergoing a mild retrofit at Pueblo prior to embarking upon a tour of several key cities where cars of this type could be used. Then, on Aug. 11, the SOAC program was set back by about six months when the test cars ran through an open switch and collided with an "adapter" gondola car, killing the engineer and seriously damaging the lead car.

—Advanced Concept Train-Phase One (ACT-I). A peek into tomorrow so far as public transportation vehicles are concerned, ACT-I goes one step beyond the SOACs, emphasizing the ultimate in passenger comfort and convenience using concepts and components many of which have not yet advanced beyond the prototype stage. The ACT-I search into the future was managed by the Boeing Vertol Co., with four other companies participating in the development of the new design concepts. They were: Garrett AiResearch; General Electric; Rohr; and Vought.

In addition to seeking out better methods of providing passenger comfort and convenience, these firms also sought out better means of maintaining the vehicles, better safety and communication systems, more reliable propulsion methods and better ways of conserving the energy needed to operate the trains.

One of the four firms that prepared ACT-I design proposals, Garrett AiResearch, envisioned for its vehicles an onboard energy storage flywheel propulsion and braking system controlling DC traction motors. A pair of transit cars (R-42 series) have been borrowed from New York for the purpose of fitting them with prototypes of the energy storage system. These cars are scheduled to be tested at Pueblo before being sent on to New York where they will be integrated in trains operating on the transit system there. The energy storage system is expected to not only conserve power but also to help lower the heat levels in the subways.

Meanwhile, another pair of R-42 subway cars at the HSGTC have been serving as test beds for developing instruments which will become part of a portable rail diagnostic system.

—Dual Mode. A semi-automatic system in which a bus will pick up passengers on the street and then move to a special guideway where it will operate automatically, this concept is now being studied by Pueblo engineers. Actually, about 20 different concepts of a duel mode system are being evaluated, and it could be that two of these concepts will be selected to progress on to the hardware stage by 1975. ■

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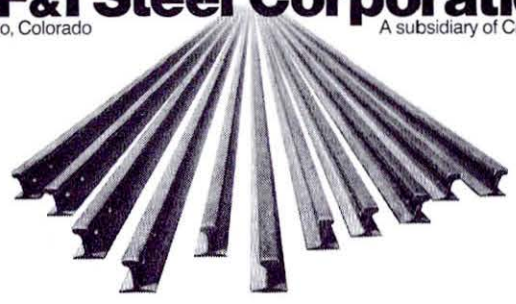

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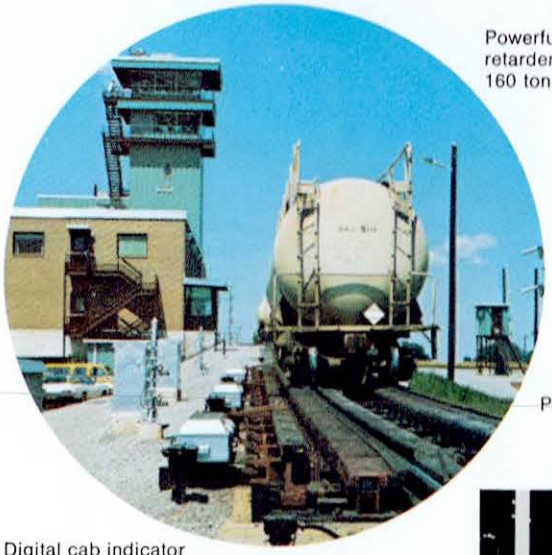

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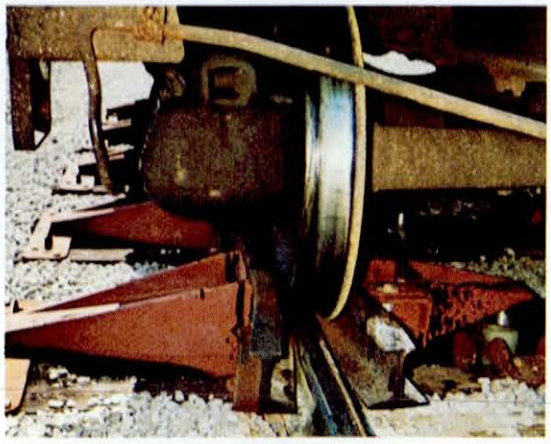

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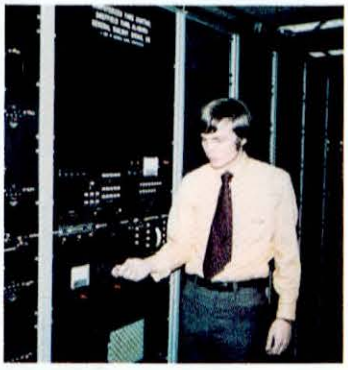

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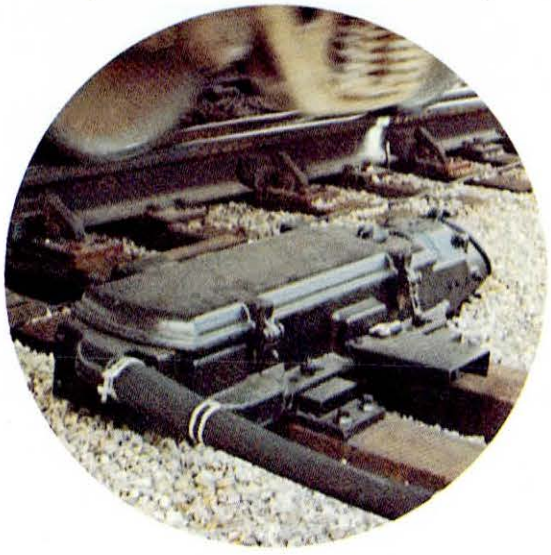
Hump conductor's console effectively displays the current status of all humping operations.



The Southern Railway's new $15 million, 32-track yard at Sheffield, Alabama, expedites traffic in the Memphis-Chattanooga-Birmingham triangle. Computer planned east and west train routings from Sheffield Yard help to speed Southern freight through large metropolitan areas.

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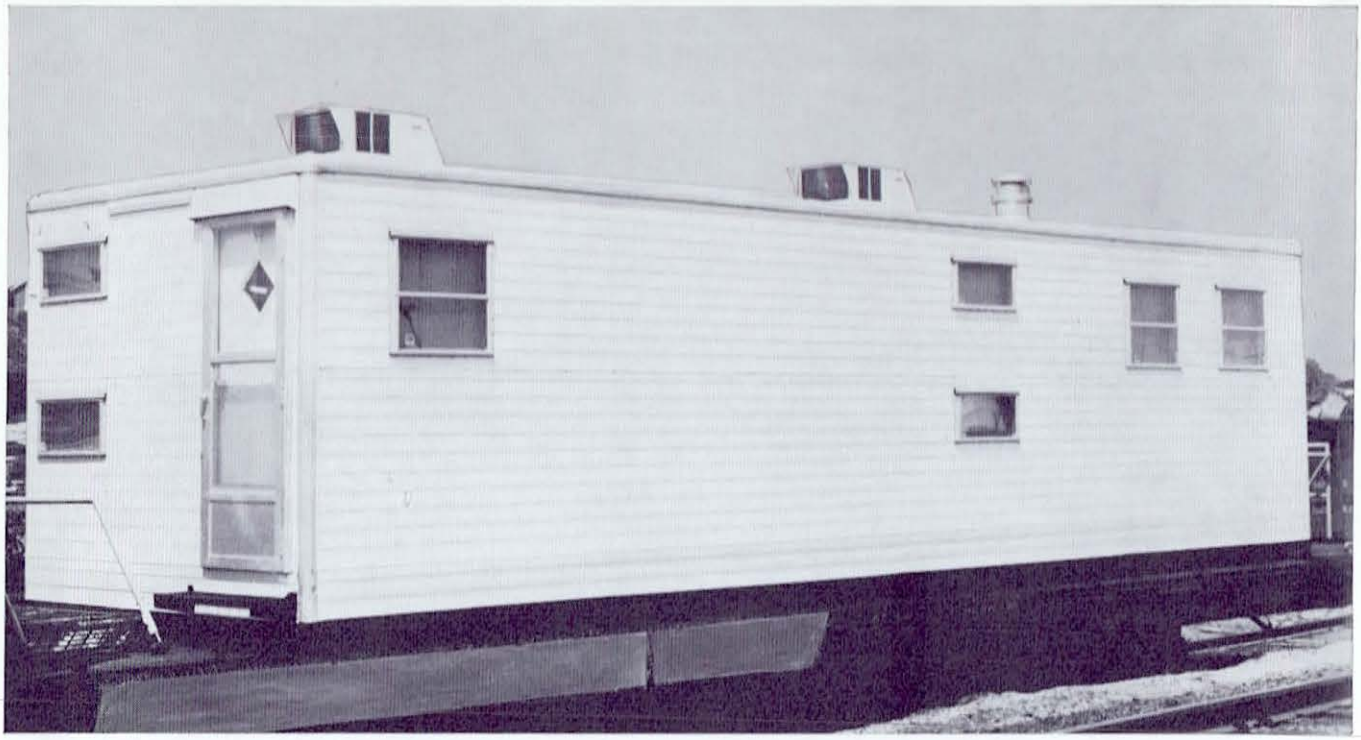

• shear cushion shock mounted on open deck flat cars. Ten feet wide, Lengths to 42 feet.

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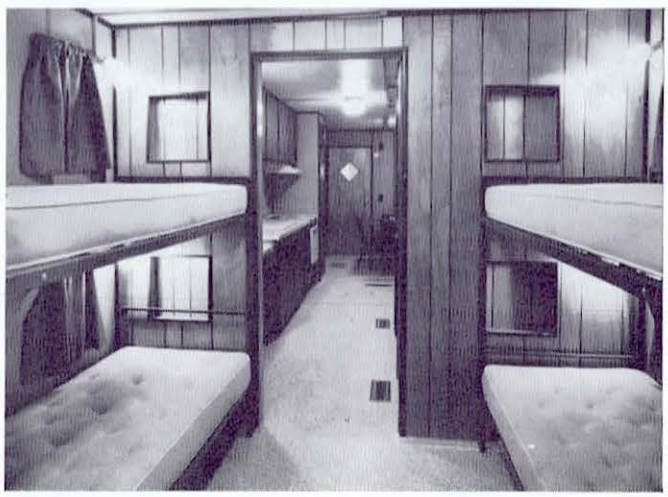

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Engineers' view of Washington Metro is

By MERWIN H. DICK,
Engineering Editor

When seen through the eyes of civil engineers, with the viewing being done mostly underground, construction work on the Washington Metro is found to include some eye-popping design forms and construction problems and procedures. They include:

—Vaulted concrete ceilings at underground stations, which are coffered in a manner that gives them the appearance of a series of bathtubs placed upside down side by side and end to end.

—"Floating" mezzanine levels in the underground stations which have no structural connection with the concrete side walls.

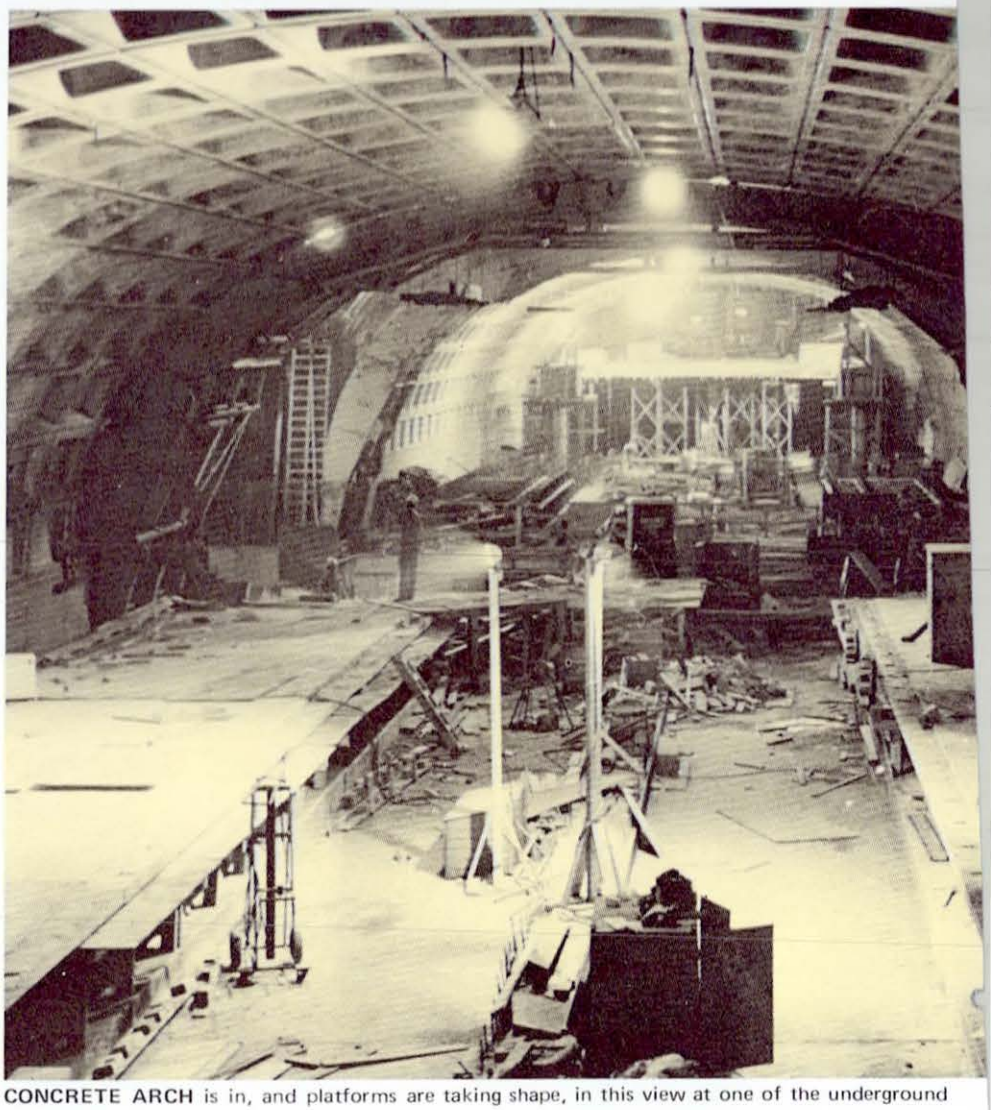
—Placement of the concrete for 50 feet of tunnel lining at the stations in a single continuous pour.

—The expenditure of $8 million to underpin government buildings in a single contract to permit construction under them of the subway and a station.

The opportunity for railroad civil engineers to make a Metro inspection came during the summer meeting of Committee 22, Economics of Railroad Construction and Maintenance of the American Railway Engineering Association. During the first day of its meeting at the new L'Enfant Plaza Hotel, the committee was briefed on the Metro project as a whole, with particular emphasis on the engineering aspects. The next day the committee members were taken on a guided tour of some of the more interesting aspects of the project, including an inspection of subway stations under construction and stretches of concrete lined tunnel that were about ready to receive the tracks.

Both the briefing and the inspection tour were arranged by James A. Caywood, senior vice presiden of DeLeuw Cather & Co. which is the general engineering consultant for the project, with Caywood in over-all charge as project manager. DeLeuw Cather is also construction manager for Phase I of the project.

● **"Biggest public work project."** In the briefing, Robert S. O'Neil, vice president and chief engineer of DeLeuw Cather, explained that Washington Metro, being built by the Washington Metropolitan Area Transit Authority, will serve the District of Columbia and surrounding Virginia and Maryland suburbs, and that ultimately it will consist of 98 miles of standard-gauge, double-track, electrified railroad. The total cost will come to $2.98 billion. The project was labeled by Caywood as the "largest public works project ever undertaken in the history of the country."



CONCRETE ARCH is in, and platforms are taking shape, in this view at one of the underground

Of the total length of the system, 42 miles will be at ground level, including 30 miles along existing railroad rights-of-way or in medians of highways. Nine miles will be on elevated structures and 47 miles will be underground. Of these, 15 miles will be in rock tunnels, 11 miles in earth tunnels and 21 miles cut-and-cover.

The system will be divided into three divisions which, operationally, will be entirely separated from each other. At the five locations where the divisions intersect, they will cross at different levels. Two-level stations will be built at four of these locations.

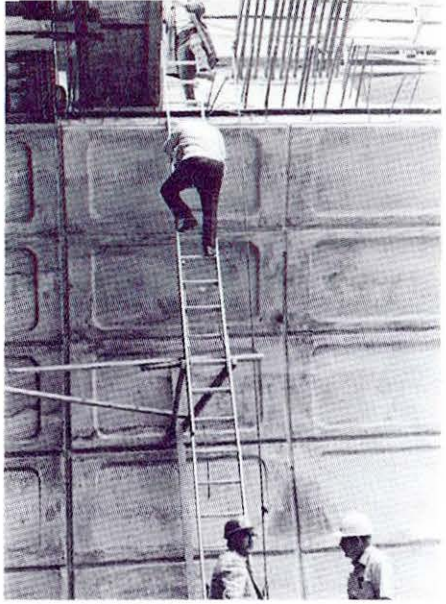
To permit transfer of equipment, the divisions will have single-track connections. A single heavy repair shop will serve all divisions. However, each division will have its own shop for performing maintenance work on equipment.

● **53 stations underground.** Of the 87 stations, 53 will be underground. Since both the cars and the stations will be air-conditioned, patrons will have the benefit of an air-conditioned environment as long as they are on WMATA premises. The tunnels will be mechanically ventilated.

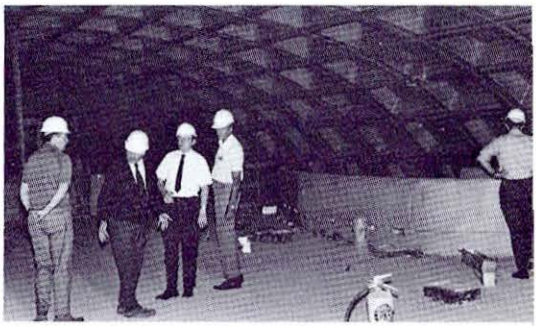
Continuous-welded 115-pound rail will be used throughout. The 150-pound third rail will also be butt-welded. Maximum curvature has been set at 8 degrees and the superelevation will permit a train speed of 45 mph on such curves. Ground-level trackage will be laid with wood ties.

The underground portions of the system will provide a variety of construction forms depending on the method of construction and the material encountered. Some of the rock forma-

eye-opener

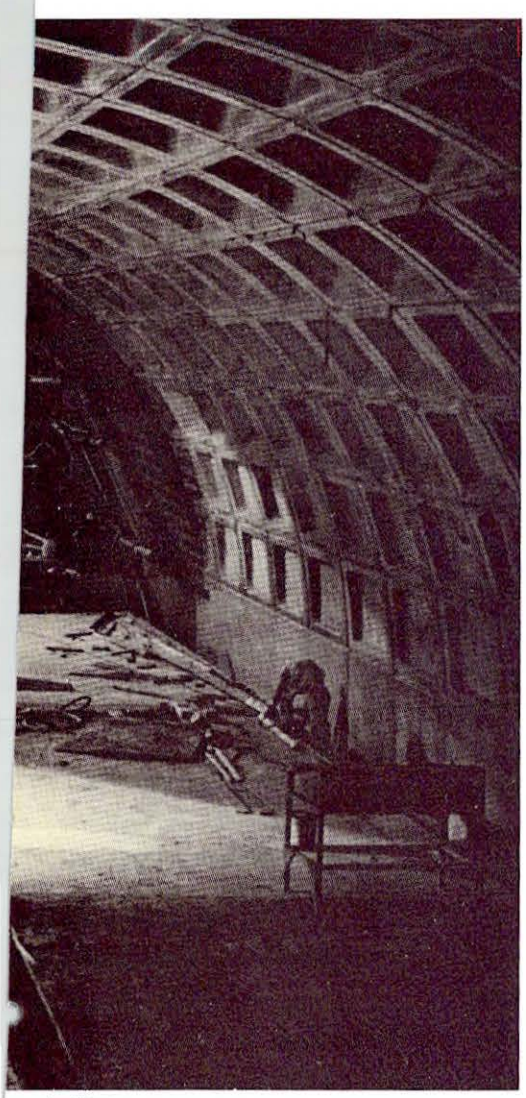


AREA ENGINEERS during their "worm's eye" inspection of D.C. Metro construction.



"FLOATING" mezannine level at partly finished station impresses AREA visitors.

CONSTRUCTION WORK goes on alongside Washington Union Station (left). Prevalence of monumental-type, older buildings in city complicates job.



stations.

tions in the area are "extremely poor," but the soil is generally of acceptable quality for construction. Recent progress in hard-rock tunneling machines has led to a design approach permitting use of these machines on much of the 15 miles of rock tunnel required by the project.

In some cases tunnels in rock formations will be double track with a horseshoe shape, while circular single-track twin tunnels will be constructed in others. In the first rock tunnel project, drilled by conventional methods, alternative bids were asked for shotcrete lining or cast-in-place concrete lining. All 10 bidders quoted on the shotcrete lining; no bids were received on the cast-in-place concrete liner. The shotcrete is a high-strength, fast-setting pneumatically applied concrete in which the maximum-size aggregate is 3/4 inch.

All earth tunnels will have a circular

SHOP FOR MAJOR REPAIRS to rolling stock is already close to completion, although its services will not be needed until sometime in 1975.

configuration and will be shield driven. Alternative bids will be taken on fabricated steel, cast iron, ductile iron and cast-in-place liners.

In cut-and-cover sections a double-barrel concrete box section is being used. When constructing such sections the street is closed and excavation work started. When this work has progressed sufficiently the excavation is covered with timber mats so that street traffic can be resumed while the excavation proceeds below.

● **Concrete arches for subway stations.** All underground stations have the vaulted and coffered construction with a width at the track level of 62 feet to 65 feet. Where the cut-and-cover method is used, the concrete arches will be cast in place. In rock sections, precast sections are being used.

All underground stations will be free of columns and obstructions. To accommodate trains of eight 75-foot cars, platforms will be 600 feet long, and will be free-standing relative to the station walls. The mezzanines, also "free-floating" in the sense that they will be entirely within the station vault, will be supported on columns.

All levels will be connected with high-speed escalators. Elevators will be provided for the use of the handicapped.

● **Protecting against vibration.** Great care is being taken to minimize noise and vibration transmitted from the subway tunnels to nearby buildings. Through the station areas and at other critical locations the track will be supported on a concrete slab that "floats" on neoprene or fiberglass pads, with similar pads placed along the edges. Direct-fixation rail fastenings are being used in the tunnels between stations, and here the rails are separated from the concrete by 3/4-inch neoprene pads.

The design and construction of underpinning for buildings above or adjacent to underground sections of the Metro is proving to be a major engineering challenge. Because of a local ordinance restricting building heights in the downtown area, many buildings are 11-story structures on spread footings. Also, the city has many monumental-type older structures. These two factors—together with the difficult soils and the deeper profile necessary to accommodate the high-arch stations where stations are under buildings—combined to complicate the problem of designing and constructing underpinning.

Buildings adjacent to cut-and-cover tunnel sections also have had to be underpinned before excavation could proceed for the tunnel. Underpinning work involves excavating beneath the building and installing supports under existing footings to carry the structure while construction goes ahead on the tunnel (or station) underneath or adjacent to the structure. The massive nature of the underpinning, together with the expensive character of such work, explains its high cost, amounting to $8 million in the case of one contract section.

● **The elevated structure.** Elevated portions of the Washington Metro will have two types of superstructure. One will consist of precast concrete box girders and the other will be of steel deck-girder construction with a cast-in-place concrete deck. In both types rail fastenings will be of the direct-fixation type. In both cases the spans will be carried on a single concrete column at each support point.

During the briefing, members of Committee 22 also learned a few things about the equipment to be used and the service to be provided by the Metro system. The trains will be designed for automatic operation, at maximum speeds of 75 mph, but will have controls for manual operation. During periods of peak traffic the trains will be operated at 90-second headings. The system will be closed down between 1 a.m. and 5 a.m. each day. It is expected that most regular track-maintenance work will be performed during this period.

For construction purposes Washington Metro is divided into six phases. Phase 1, 4.6 miles long, is scheduled for completion in mid-1975, and 1980 is the date set for final completion of the system. At the time of the Committee 22 meeting, work was under way on the stations and tunnels in 27 miles of route.

● **Going under ground.** Members of Committee 22 thus were armed with a general background of the project when they were taken on a tour of the work the day following the briefing. They soon learned, however, that the briefing did not give them a conception of the massive and complex nature of the underground operations involved in constructing a modern subway system. An accurate conception can be obtained only by clambering up and down ladders, trudging through miles of partly finished tunnels and viewing at first hand the work of constructing the concrete arches at an undergound station.

The first major construction operation underground was encountered at G and 12th Streets where two tunnels intersect, thus requiring a two-level station. In this case the distance from the base of rail of the lower tunnel to the street level is about 75 feet. (At one location this distance is 110 feet.)

Since the excavation at G and 12th Streets had been carried out by the cut-and-cover method, the concrete arches were being poured in place. Fifty-foot traveling forms were being used for this purpose, and the requirement was that the concrete be placed in a single continuous pour for the length of the traveling forms.

It was at this location that committee members first noted the striking effect of the "bathtub" coffered ceiling. After the forms are removed, the concrete is sand-blasted and a sealer is applied. This treatment, along with the indirect lighting in the station areas, heightens the effect of the unique ceiling design.

The final point of inspection by the committee was the heavy repair shop which, not far from Washington Union Station, is practically completed and ready to go into operation although it will be well over a year before its services will be needed. The ultra-modern design of this facility, and particularly the equipment contained in it, drew expressions of admiration, even envy, from the committee members. "I wish we had that kind of money to spend," was a remark heard more than once from the visitors. ■

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Minicomputers control Southern's new

Southern Railway's new minicomputer controlled yard at Sheffield, Ala., is humping about 1,800 cars daily and will eventually classify up to 2,400 cars daily. This $15-million yard, in service since May, has reduced the work load at other Southern yards at Birmingham, Chattanooga and Memphis. With the exception of run-through trains, all westbound traffic for Sheffield and beyond is classified at the new yard. All eastbound traffic from Memphis and beyond is also classified.

Sheffield, in the northwest corner of Alabama, midway between Memphis and Chattanooga, is at a junction with Southern's line going southeast to Birmingham. The yard was spotted from a system-wide approach to improving customer service and reducing the workload at other major classification yards to meet Southern's annual traffic growth of about 6%. Sheffield yard improves local service to nearby Florence and Muscle Shoals shippers. Also of help to vehicular traffic in Sheffield is that the new yard away from the old "in town" yard eliminates most of the highway congestion at grade crossings caused by switching at the old yard.

YARD CONDUCTOR MONITORS pinpuller via closed circuit tv. He can see next 10 cars to be humped on crt device below monitor. Yard can handle up to 2,400 cars a day.

● **Minicomputer control.** The prime control system contractor, General Railway Signal Co., selected five Nova 1200 minicomputers to handle automatic retarder control, automatic switching and the management information system functions at Sheffield. There is one computer each for these functions, with a backup computer for process control and one for any misfunction.

Sheffield is Southern's first classification yard tied in with the Management Information Services (MIS) computer center in Atlanta, Ga. Yard operation is as follows:

When a train bound for Sheffield from Birmingham, for example, leaves the Birmingham yard information is sent to the Atlanta MIS computer center. The center makes an advance consist report for Sheffield and provides class track designations for classifying the train. This information is sent to the minicomputers at Sheffield yard.

As the Birmingham train enters Sheffield yard it passes tv cameras that provide a yard clerk with visual car checking capability. Also, a videotape recording is made which enables the clerk to check numbers or initials that are faint or hard to read as the train passes his tv monitor.

At Sheffield, the six receiving yard tracks hold 915 cars. The 32-track classification yard has a car capacity of 1,160, and the seven forwarding yard tracks hold 964 cars.

After the inbound train has been inspected, the advance consists checked against the tv or videotape of the train, operating personnel at control tower are notified, particularly the yardmaster and yard conductor.

Using a cathode ray tube terminal, the receiving yard track number is input to the computer along with the instruction HP indicating that the train is to be humped. A Centronics printer at the yard conductor's location provides him with a hump cut list. Cars are pushed over the hump at about 2.25 mph, the speed of the hump locomotive being controlled by the process control computer. The yard conductor selects the locomotive on his pushbutton console and when the train reaches a specified point in approach to the hump crest, automatic control takes over, provided that the hump engineman has moved a control lever from Manual to Automatic. A radio link is used for this computer control of the hump locomotive.

● **TV at hump.** Closed-circuit tv provides the yard conductor with a view of the pinpuller's operations. Normal procedure is for single-car cuts. For longer cuts, the yard conductor notifies the pinpuller via a talk-back speaker system.

The yard conductor has a crt device that shows the next 10 cars to be humped. He also has the retarder control console which provides him with switch position information, skate retarder positions, hump engine controls, speed indicators for each retarder, and manual control of retarders and switches. A communications console provides him with talk-back speaker and radio communication with operating and maintenance personnel.

As cars are pushed over the hump, the computer takes over to route cars to the proper class track. Computer control of the master and six group retarders assures that cars enter class tracks at the proper speed for safe coupling. Inert, weight-responsive skate retarders are on each of the 32 class tracks.

The Sheffield yard computer has been programmed to automatically "swing tracks" when they become full (four car lengths only available beyond clearance).

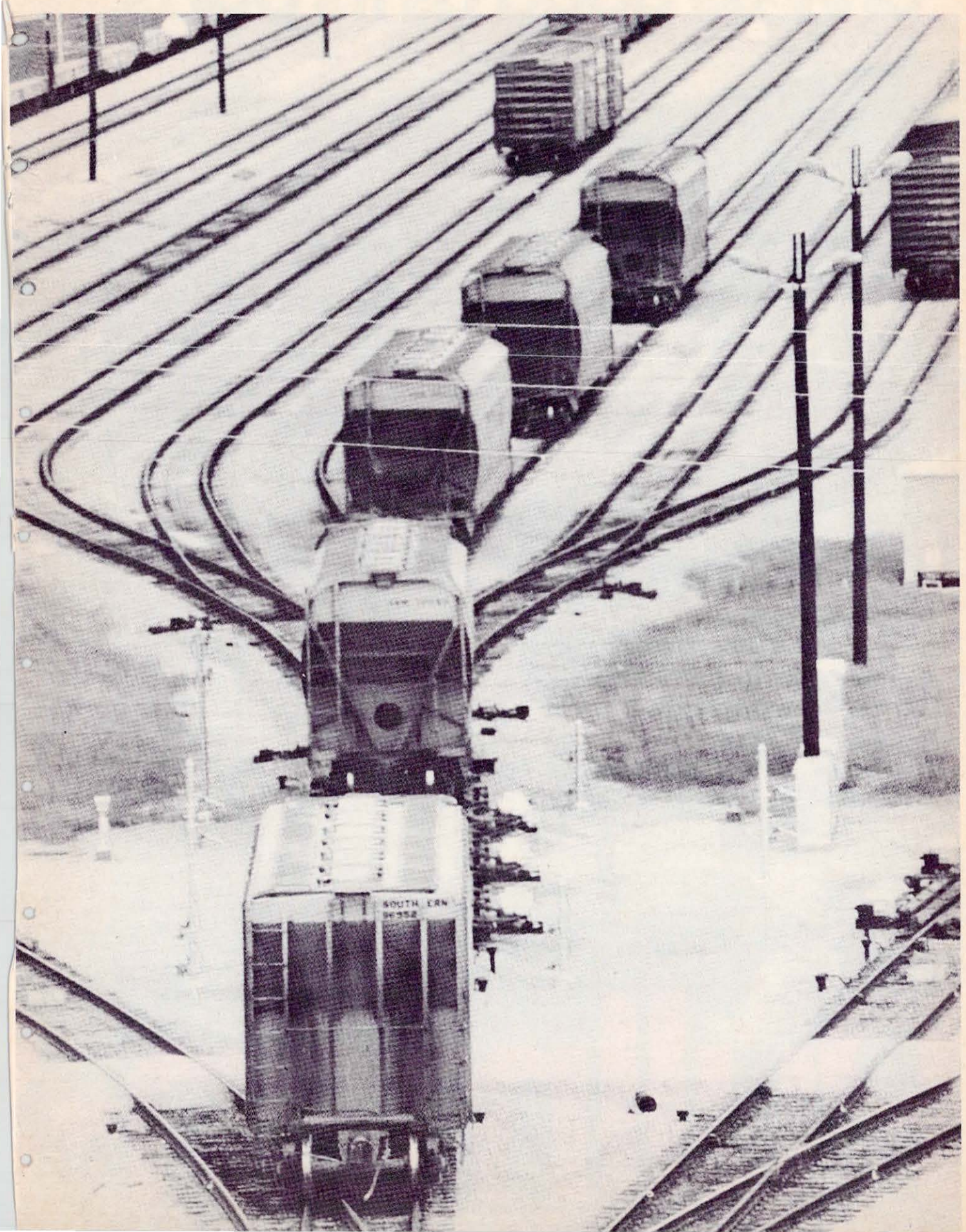
Blocks of cars pulled from the class tracks are monitored by tv and also videotaped.

● **Pull-back control.** At the crest tower, a yard supervisor inserts work orders for the pullback operation via crt input. These work orders are displayed at an outdoor, electrically lighted display in the pullback area so that yard crews receive instruction via this display and radio from the yard supervisor. The indications are: from track; number of cars; last car number; and to track. Inventory is automatically transferred from the class track to the proper forwarding track. When a pullback move is completed, the yard crew so advises the yard supervisor by radio.

The yard computer is informed of the pullback moves (or train makeup), and it produces a train consist list. This list is checked against the tv recording of the departing train, after which the consist information is sent to the MIS computer center in Atlanta.

Blocking patterns established at Sheffield yard have not only reduced classification yards, but have enabled some yards, such as Macon, to makeup trains that can bypass Atlanta and run through to Sheffield with westbound traffic. Similarly, Sheffield makes up trains that can bypass Atlanta or other major yards en route to their destination. The new Sheffield yard, says a Southern spokesman, really squeezes waste out of distribution. ■

Sheffield hump yard



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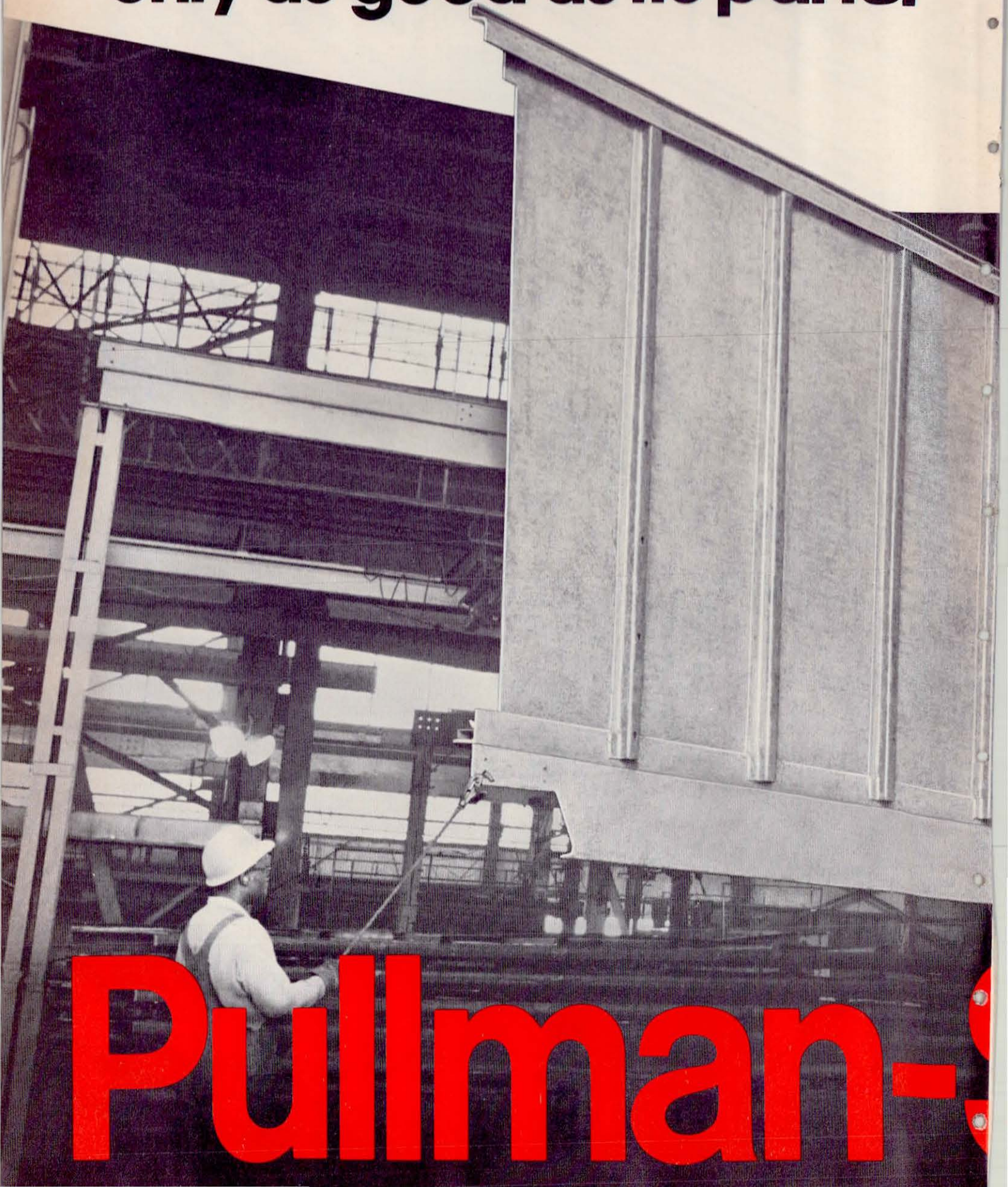

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C&S: Simpler, sturdier hardware

(Continued from page 32)

handling the logic of ctc consoles has reduced space requirements considerably as compared with relay systems to perform the same logic functions.

Another space reduction that is paying handsome dividends in reduced costs is that for filing documents by the use of microfilm. Eastman Kodak has microfilm systems that several railroads are using for the storage medium for waybills and other important documents, including tariffs.

A time-saving development in the communications area is increasing productivity—through use of speed communications links to handle greater volumes of data transmission. General Electric's TermiNet 1200 printer is just one example of a data-transmission terminal that sends data at 1,200 bits per second.

● **Continuing progress.** Manufacturers recently surveyed have a common theme to their responses, namely that research and development work is a continuing process, not a crash program to develop a new, immediately-marketable product. Most of their efforts are in response to customer needs. For instance, Edison Battery Division of McGraw-Edison Co. reports that development work with batteries for signaling and communications work is directed to three major areas: Improved performance, improved service life, and the development of batteries for a wider range of applications.

Specifically, Edison improved its type ST Carbonaire primary batteries by substantially increasing the ampere-hour capacity (1,000 to 3,000 amp hr ranges). Also, two new nickel-cadmium storage batteries have been introduced with capacities of 340 and 400 amp hr, respectively.

"For the near-term future, we expect our principal R&D efforts to be concentrated on continuing improvement of the basic types of battery power we presently manufacture. We believe there is still a great deal can be done in that area," reports W.A. Melroy, director of advertising, Edison Battery. "For the long-term future, there is a good likelihood that new types of power sources will be developed and become practical. We are continuing a limited amount of research in that direction."

● **Long-range outlook.** For the long range, or possibly the "blue sky" area of activity, many firms share the thoughts expressed by Harmon's Heggestad that emphasis will be on automation and automatic control systems:

"Looking ahead, from the railroad's viewpoint, some of the things we see as possibilities are crossing-protection systems that will be extremely simple to install having a minimum of interaction with existing signal systems.

"We also anticipate the coming of complete block-signal systems that will operate without the use of line wires of insulated rail joints and provide all of the safety and operating features available in today's systems.

"We anticipate the eventual coming of electrification on a large scale and the development of equipment that will permit adaptation of existing signal systems to electrified territory at a minimum of expense.

"We envision modern train dispatching centers covering several thousand miles of railroad, in some cases an entire railroad, with just a few dispatchers, and most of the dispatcher's work being done automatically. Having all of this data on train performance available at one location will provide an excellent base for total management-information systems. This, combined with some of the data systems in operation and being developed today, could lead to greatly increased efficiencies in the utilization of manpower, equipment and resources." ■

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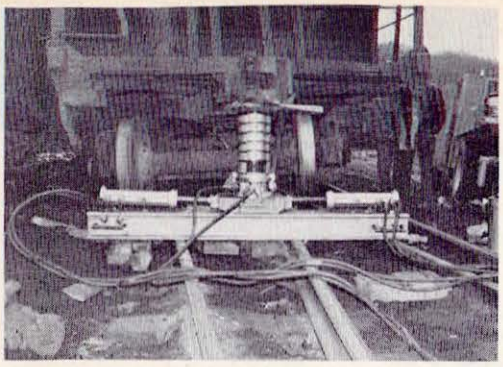
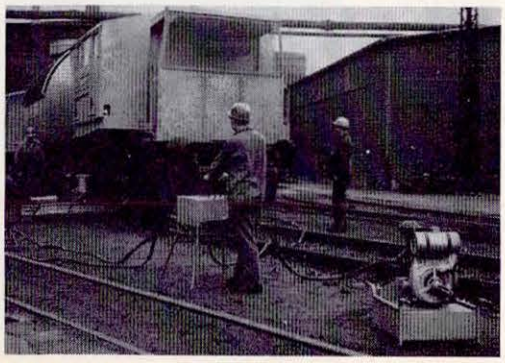


100 ton coal car with 66 ton multi-stage jack

Six-axle locomotive with 132 ton multi-stage jack

250 Ton Locomotive



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London

To the Editor:

I have read with interest, in the June 25, 1973, issue of Railway Age, the article, "Rail-hauled autos go 'out of sight'." My interest is in relation to the stability in high wind conditions of vehicles of this height.

We are at present considering designs of special wagons for the transport of cars in the proposed Channel Tunnel project, and these are of similar height to those mentioned in your article. I would, therefore, like to enquire, from the American railroad authorities, their experience and views relative to wagon stability.

H. Wilcock
Rolling Stock Design Engineer
British Railways Board

(Mr. Wilcock can be reached at the British Railways Board, 14 Melbury Terrace, London NW 1, U. K.—Ed.)

Restructuring UMTA

Washington, D.C.

To the Editor:

The transit industry will welcome UMTA Administrator Frank C. Herringer's examination of his management structure and the RD&D program (RA, July 9, p. 46). The current $1-billion-a-year level of activities indicates this need. Considering the present number of programs relating to planning, marketing, capital grant management, technical studies, operating demonstrations and R&D, there is a growing need for a restructuring within UMTA. This, I agree, fulfills the need to focus on a manageable number of projects which hold promise of producing results which are economically, socially and institutionally feasible within a meaningful time frame. The mounting recognition of the environmental and energy problems adds significantly to the importance of the UMTA program.

The transit industry will support Mr. Herringer and his staff in their efforts.

Robert M. Coultas
Executive Vice President
Institute for Rapid Transit

Steel on steel

Hopewell, N.J.

To the Editor:

You are to be commended for the Viewpoint article entitled, "The future of steel on steel," in the August 13 issue of Railway Age. An emphatic "no" is the least that can be said concerning the question of replacing conventional rail service with some exotic mode. If Congressman Adams sees the levitated vehicle as the only show in town, he certainly has a narrow view of what technically advanced nations are doing to improve their rail systems.

For example, on the same day this issue of Railway Age was dated, the Germans began construction on a new rail route between Hannover and Gemuenden that will be carrying 190-mph trains in the 1980's. According to British researchers, the use of linear induction traction on these new rights-of-way would enable conventional trains to travel 250 mph, at least. At this point, it seems rather a waste of resources to introduce a new (levitated) mode if 300-mph speeds are its only virtues. In fact, in England, where population densities are greater than in this country, the government has decided to scrap levitated vehicle R&D because it is economically unsound compared to conventional rail.

Otto Janssen
PTJ Publishing, Inc.

Transit's "big problem"

Philadelphia, Pa.

To the Editor:

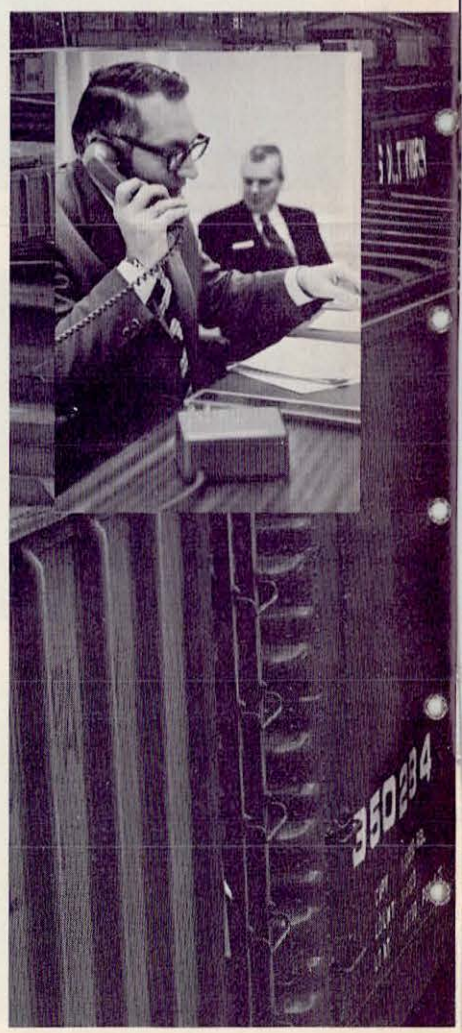
The major problem facing the mass transportation industry today is not the design of more sophisticated modern space-age equipment, nor is it the maintenance of that equipment. The big problem today is the lack of a concerted cooperative effort amongst industry members to work together to solve America's most pressing problem, Urban Mass Transportation. Without vital mass transit, no city can long survive. Automobiles and the expressways are not the panacea for our mobility crisis.

The entire productive capacity of the industry falls short of meeting the projected needs of America's 40 largest cities. Funding required for Los Angeles alone will consume our present budget. Despite this pressing need, we do not make our story known to America's legislators.

How long will the engineers continue to bicker amongst themselves about the benefits of chopper control rather than tackle the problem of public awareness? How long will we abrogate the responsibility of political action to the legal profession only to bewail the consequences which are due to lack of public understanding?

The need is great and the hour is late. Transportation engineers and planners must make their case clearly and audibly or there will be utter chaos in our cities.

Martin Lenow
Manager, Marketing
Surface Transportation Systems
Boeing Vertol Company



How a telephone conference system helps keep track of a railroad.

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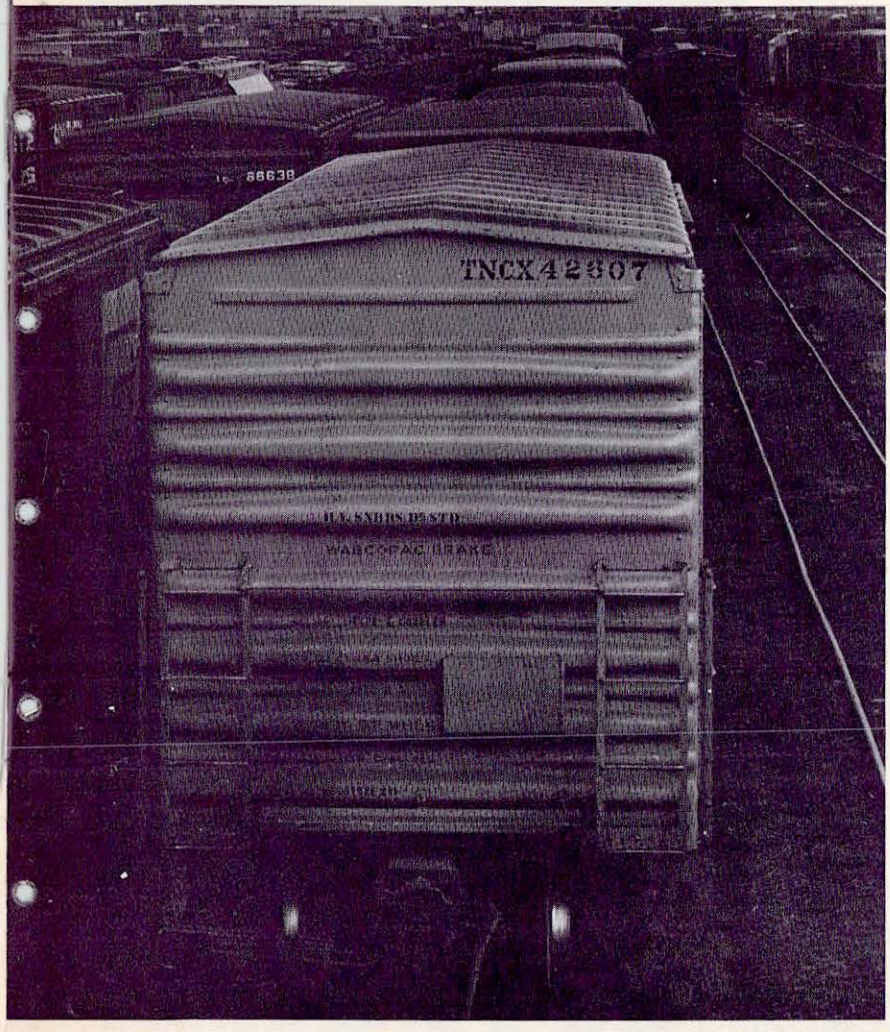

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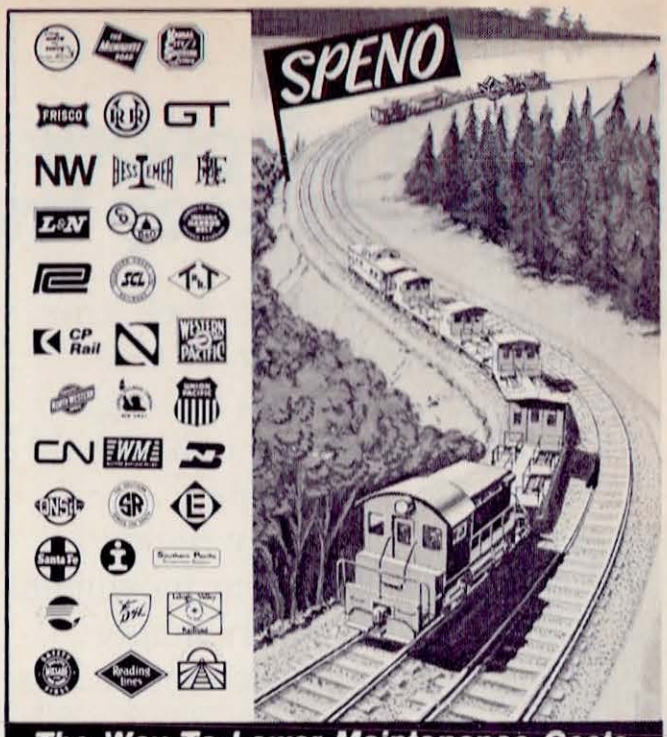

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We have the products and tooling to do your electrical and electronic maintenance and repair jobs quickly and reliably. Some of our more than 40,000 types and sizes of AMP products are shown here. We also provide, at no cost, railway specialists who will train and advise your electricians in the selection and use of AMP terminals, connectors and tools to assure best results.

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Heavy duty terminals and splices for power cable up to 2750/24 size.

Regular and long-barrel AMPOWER terminals and splices handle solid or stranded cable. Terminals and special terminal disconnects feature double-thick tongue for heavy duty service. Terminals available with blank or stud-hole tongue.

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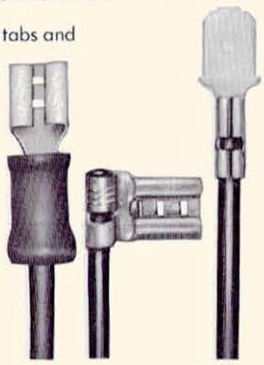
Slip-on tab terminals with pre-insulated sleeves.



AMP FASTON tabs and receptacles assure dependable, vibration-resistant connections. Insulated sleeve prevents accidental shorts. Available in straight-on type, and in flag type for use where space is a critical factor.

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Heat-shrink tubing and tape for fast cable repair and sealing.

Flexible heat-shrink tubing, thick or thin wall type, with or without sealant, simplifies re-insulation of cable damaged by heat or mechanical mishap. Also insulates splices. Self-sealing tape permits fast, easy repair, sealing and weather-proofing of odd-shaped cable joints.

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Short-proof terminals with bonded insulation.

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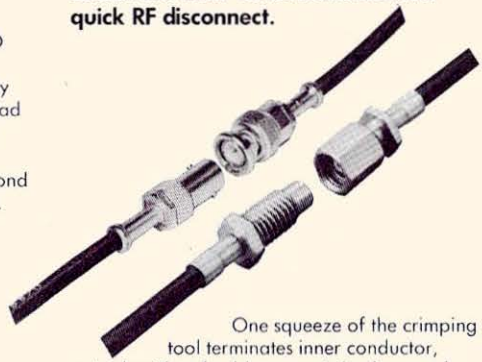
Solderless AMP coax connectors for quick RF disconnect.



One squeeze of the crimping tool terminates inner conductor, outer braid and cable support simultaneously. No soldering iron needed. No danger of damaged insulation due to heat. Fast, reliable. Wide selection of single in-line connectors for communication and signal applications.

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Solderless connector cuts 25-pair cable termination time by 50%.

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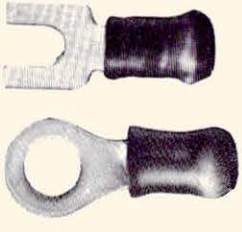
Pre-insulated PIDG terminals cover wide wire range.

Slotted tongue and ring tongue types for use with 22-10 AWG wire on barrier strips, power supply lines, control circuits and similar applications. Insulation is color coded for proper wire size ranges to assure foolproof termination with hand tools. Heavy duty types available for severe vibration service.



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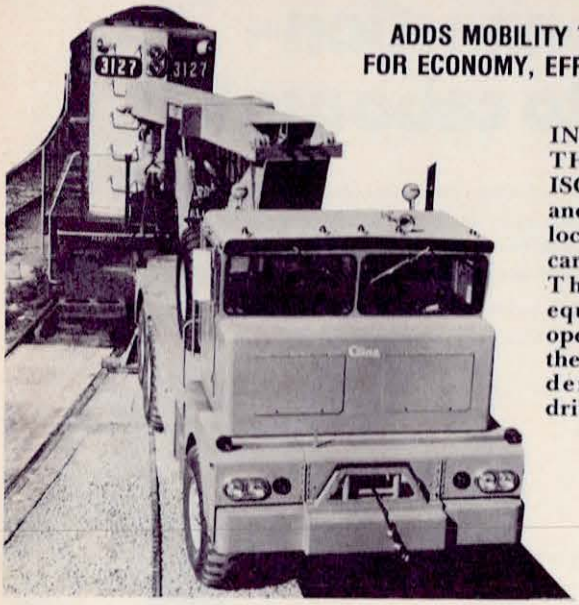

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Beating odds in rolling stock design

(continued from page 38)

constructed by Whitehead & Kales in cooperation with Detroit, Toledo & Ironton; Louisville & Nashville; Norfolk & Western; Seaboard Coast Line; and Union Pacific. This 17-foot-7-inch-high car, although totally enclosed, is low enough to travel in the East where clearances are fairly restrictive. In addition to its complete enclosure, the car features a tie-down system that would allow automatic loading, tri-fold end doors like those on Autoguard, and some perforated side panels to permit entry of light to facilitate loading and unloading. Other suppliers, other shippers and other railroads are working on still other methods for transporting new automobiles.

● **In suspense.** Suspensions for advanced cars such as these have probably been the major area of concern of component suppliers, carbuilder engineers and railroad mechanical officers for the past decade. A few months ago, for instance, American Steel Foundries unveiled its T-11 truck for 100-ton cars, designed to reduce the damage effects of lateral shock by as much as 75% and by as much as 60% in the vertical direction. As the T-11 with its longer-travel coil springs was being developed, the ASF Simplex side bearing was being refined for application with the new truck.

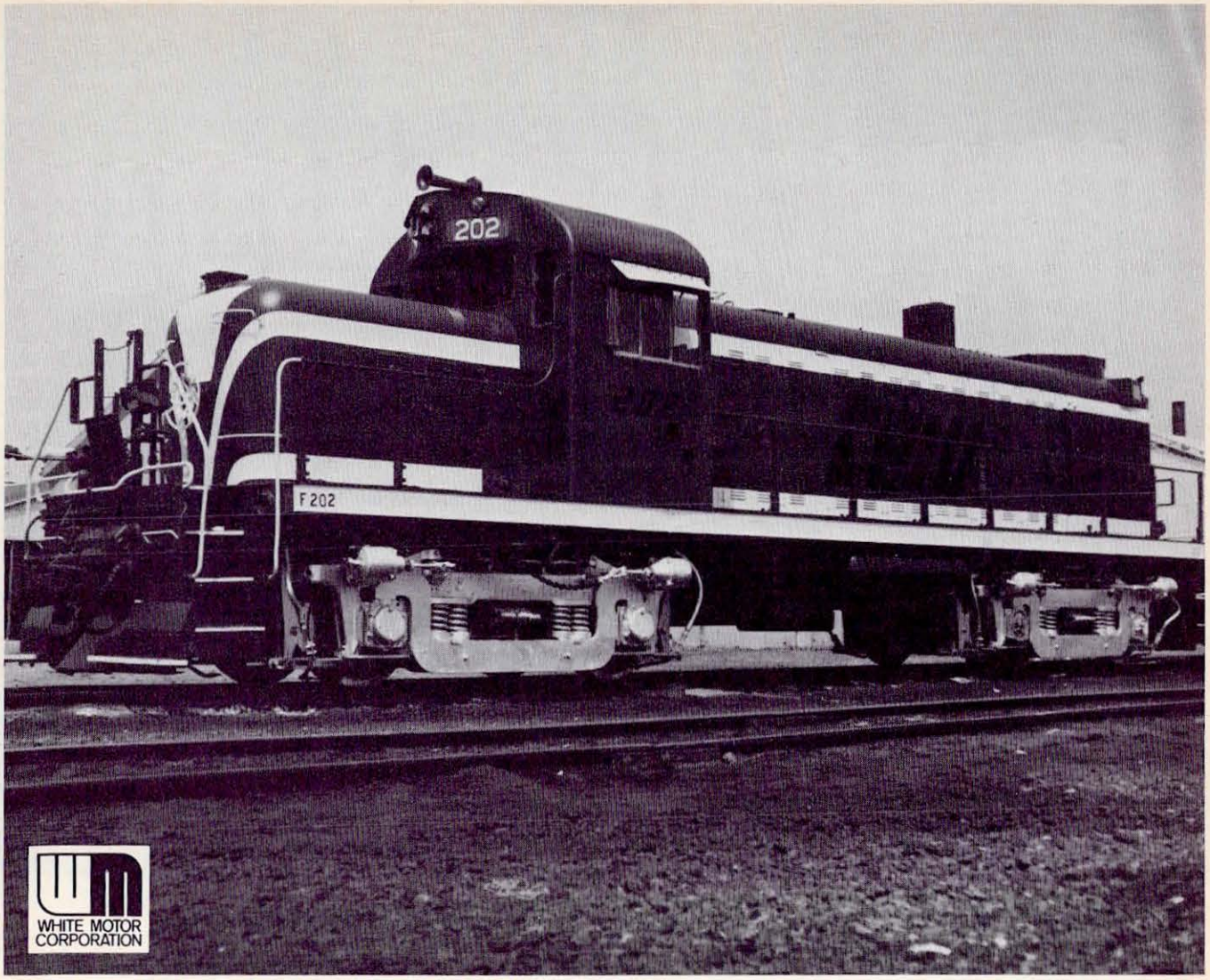
Frequently, rolling stock designers have come under fire for not utilizing the technology developed for suspensions of other types of vehicles. It is important to note that a problem unique to railway freight equipment having long-travel springs is that the wide variation between the empty and loaded weight of the car must not so compress the suspension that couplers will no longer engage properly. This is a constraint not placed upon designers of other suspensions.

In the past decade the number of 100-ton cars introduced into service has increased from 6% of the annual acquisitions in the early 1960s to fully 70% in 1972. At the same time the average per-car capacity of the entire 1.8-million car fleet has gone up nearly 25%, to 69.5 tons.

While all that has been going on, the average carload has gone up 25% in weight, the average miles per day per car are up 20% and ton-miles per train hour are up 15%. The incidence of hotboxes is down by over 55% in 10 years.

The improved journal performance is due in no small degree to the growing number of roller bearings. This will be the year in which roller bearings for the

(Continued on page 88)



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Before you decide to purchase new switching and transfer locomotives, compare the cost of new units with the cost of rebuilding your fleet of ALCO road switchers. A new 1500 HP switching locomotive will cost over $200,000. The ALCO RS3 shown above was rebuilt by John Fox, Master Mechanic in his Toledo, Peoria and Western shop and included an ALCO factory rebuilt 244 engine carrying ALCO's standard warranty. Take advantage of this money saving opportunity to modernize your switching and transfer fleet. Your ALCO salesman will be glad to discuss this with you. Write: Alco Engines Division, Auburn, N.Y. 13021 U.S.A.

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False stops are "fail-safe" stops, but they cost money!

False stops are frequently the result of over-reaction by your observer to a borderline pip on the hotbox recorder chart. Clearly any improved graphic display will lead to a significant reduction of false stops due to human error.

The Electronics Specialists Hotbox Detector operates on an advanced principle proven in actual service over a ten year period. This patented* principle utilizes a unique electronic circuit that permits duel scale presentation of scanned journal temperatures. Judgment calls are virtually eliminated.

Within the limitations of conventional chart paper, the low temperature zone for solid bearings can be expanded upward with a corresponding compression of the high temperature zone for roller bearings. Simple adjustment of each detector permits the location of the threshold between zones to suit tastes.

Other Electronics Specialists features:

Precisely gated ten inch scanning distance, regardless of train speed or direction.

Modular, solid state circuitry, employing only readily available components.

Unusually rugged transducer construction, resisting rail vibration and flat wheel impact.

Complete compatibility with available transmission terminals and chart recorders.

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one toilet that
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sailed in a boat,
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now available,
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VAPOR CORPORATION

*TM Monogram Industries, Inc.
**names furnished on request

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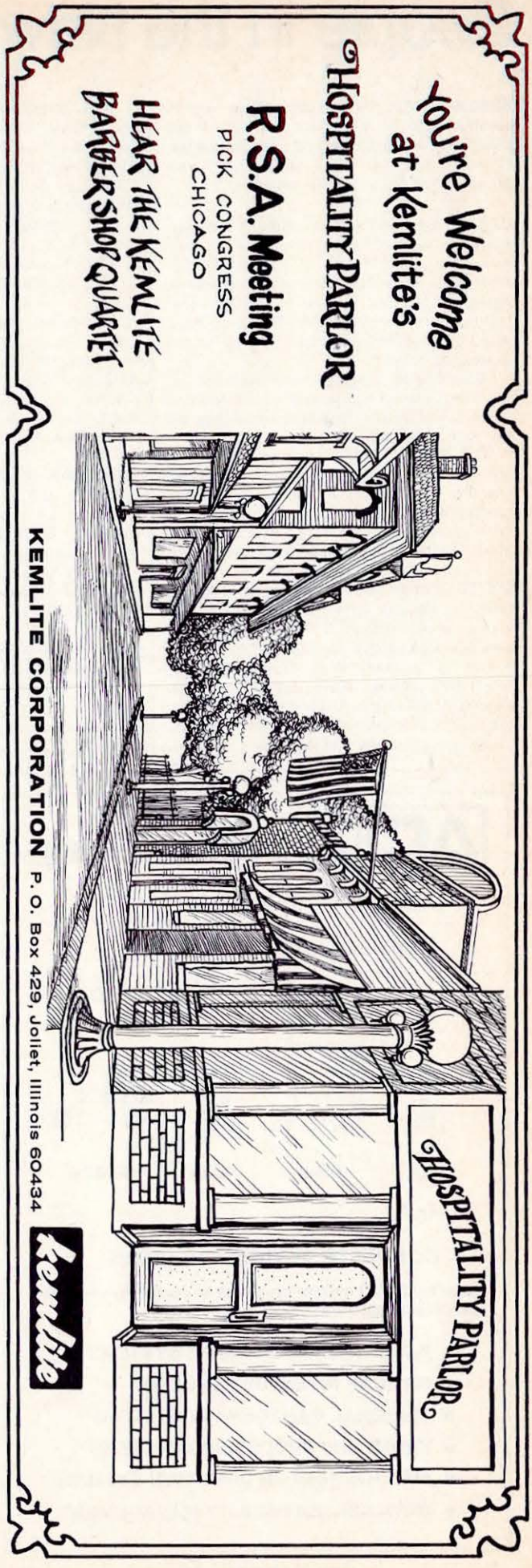

Circle 36 on reader service card

People in the News

APACHE RAILWAY.—**Flake Willis** named president and chief executive officer of this subsidiary of **Southwest Forest Industries**, Phoenix, Ariz. Mr Willis was formerly vice president and general traffic manager.

CANADIAN NATIONAL.—**C.F. Armstrong**, assistant vice president-administration, appointed vice president of cybernetic services, Montreal, succeeding **Eric P. Stephenson**, named to the new position of vice president and executive representative, Winnipeg, Man., with responsibilities related primarily to the movement of grain.

G.A. Collins, passenger promotion officer, appointed manager, passenger sales & services, Great Lakes Region, Toronto, succeeding the late **R.H. Newcombe**.

G.J. Towey, assistant manager, marketing services, promoted to manager, marketing services, Great Lakes Region, Toronto, succeeding **A.J. Gillies**, named manager, freight sales & services, replacing **W.D. Spencer**, promoted **N.M. Sokolowski**, manager, customer research services, succeeds Mr. Towey and his former position abolished. **T.E. Allison**, coordinator service design, named marketing services officer, Toronto. **L.I. Brisbin**, assistant superintendent, London, Ont., promoted to superintendent, Hamilton, Ont., succeeding **W.J.A. Daly**, promoted. **R.J. Guiney**, trainmaster, Niagara Falls, Ont., appointed transportation control officer, Toronto, succeeding **J.H. Staples**, promoted.

A.H. Dolphin, general car foreman, Symington Yard, Winnipeg, Man., appointed assistant superintendent equipment, Lakehead Area, Thunder Bay, Ont. **R.C. Jones**, assistant mechanical officer (car), Montreal, succeeds Mr. Dolphin at Winnipeg.

R.G. Hedge, assistant superintendent, Regina, Sask., appointed regional coordinator of TRACS projects, Prairie Region, Winnipeg, succeeding **A.E. Deegan**, assigned to special duties.

Alexander Bowers, assistant superintendent equipment, Winnipeg, promoted to superintendent equipment, Saskatchewan Area, Saskatoon, succeeding **A.V. Mills**, appointed mechanical officer motive power, Prairie Region, Winnipeg. Mr. Mills succeeds the late **H.A. MacDonald**.

CANADIAN PACIFIC.—**P.A. Nepveu**, vice president and comptroller, Montreal, appointed vice president finance and accounting. **G.M. Rountree**, assistant comptroller, appointed comptroller.

G.H. Veilleux appointed assistant superintendent, Trois Riveres, Que., succeeding **Y.H. Blain**, transferred.

CHICAGO & NORTH WESTERN.—**Julian S. Eberhardt**, director of industrial engineering, named assistant vice president-corporate industrial engineering and staff projects.

Stephen P. Adik, superintendent-motive power, Chicago, appointed assistant division manager-mechanical, Oelwein, Iowa.

Arthur A. Enders, diesel supervisor-system, appointed assistant superintendent-motive power.

J.F. Brower named assistant chief engineer-construction, Chicago.

James R. Feddick, director-grain marketing and pricing, named assistant vice president-grain marketing and pricing.

James A. Zito, division manager, Chicago division, named assistant general manager. Mr. Zito's successor is **Robert M. Milcik**, assistant division manager-freight transportation, Chicago division.

FLORIDA EAST COAST.—**E.J. Eicholz** appointed assistant to general freight agent, St. Augustine, Fla.

E.T. Rehnberg appointed district sales manager, West Palm Beach, Fla.

ILLINOIS CENTRAL.—**Jack E. Andrews**, general manager for coal sales, appointed assistant vice president-coal.

KANSAS CITY SOUTHERN.—**D.F. Nicola**, superintendent of transportation, appointed assistant to vice president and general manager, with headquarters as before at Shreveport, La. **J.E. Gregg**, terminal superintendent, named superintendent, Shreveport, succeeding **J.L. Deveney**, who replaces Mr. Nicola.

LEHIGH VALLEY.—**N.D. Swain**, director-system analysis, appointed assistant vice president-marketing, Bethlehem, Pa. **J.J. Donohue**, general freight traffic manager, appointed general traffic manager-rates, New York. **H.A.**

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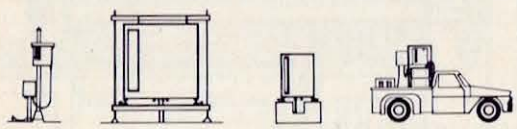

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You'll save money through reduced clerical costs, improved car handling and utilization.

We can have this system up and running in 60 days. It'll pay for itself within 6 months.

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Rader, freight traffic manager, named general traffic manager-divisions, New York.

James J. Ogle, freight sales manager-Pacific Coast, appointed assistant vice president of sales, Western Region, Chicago, succeeding **Ralph W. Smith,** resigned. **Robert D. Price, Jr.,** district sales manager, Houston, Tex., succeeds Mr. Ogle at San Francisco. **M.D. Brinker,** district sales manager, Chicago promoted to freight sales manager there.

MILWAUKEE.—**Donald M. Wiseman,** assistant vice president of sales, elected to the newly created position of vice president-sales and service. **Philip J. Cullen,** vice president-sales, elected vice president-special traffic studies, and his former position abolished. Messrs. Wiseman and Cullen will continue to make their headquarters in Chicago.

M. Gene Denney, district manager of sales, Billings, Mont., transferred to Kansas City, Mo., succeeding **John T. Conlin,** retired. Mr. Denney is replaced by **George T. O'Dore,** resident sales representative, Grand Rapids, Mich.

Thomas E. Haben, assistant superintendent of transportation, named to the newly created position of manager of government traffic, Chicago.

John H. Beton, assistant to general manager of purchases and material, appointed purchasing agent, Chicago, to succeed **Charles F. Jensen,** retired. **James V. Maloney,** senior buyer, replaces Mr. Beton.

George F. Flynn, manager of foreign freight sales, Chicago, appointed director of sales, Tokyo, Japan, to succeed **Earl E. White,** who retired July 1 after more than 49 years' service.

Frank M. Jones, staff engineer, Chicago, retired recently after 47 years of service.

Frank P. Pawlak, division engineer, Iowa, Minnesota and Dakota division, Austin, Minn., transferred to the coast division, Tacoma, Wash., to succeed **Harold E. Hurst,** named engineering assistant to general manager, Seattle.

Fred A. Barton, superintendent, LaCrosse division, LaCrosse, Wis., transferred to the newly created Chicago division, with headquarters in Bensenville, Ill. **Francis H. Ryan,** superintendent, Milwaukee division, succeeds Mr. Barton. **Norton H. McKegney,** superintendent, Milwaukee Terminal division, becomes superintendent of the restructured Milwaukee division, Milwaukee, Wis. **Frank A. Deutsch,** assistant superintendent, Milwaukee Terminal division, named terminal manager, Milwaukee. **Roy H. Love,** superintendent, **Indiana Harbor Belt,** named terminal manager, Chicago division, **Milwaukee.** Mr. Love's successor is **Ronald L. Tewell,** formerly superintendent of the **Milwaukee's** Chicago Terminal-Terre Haute division.

Frank A. Upton, chief mechanical officer, named to the newly created position of assistant vice president-mechanical, with headquarters continuing at Milwaukee, Wis.

Douglas A. Keller, regional manager of sales, Seattle, appointed assistant vice president-sales, Chicago. **Lawrence E. Fancher,** manager-pricing, succeeds Mr. Keller. **Sam R. Graf** named manager-international sales, Seattle; **James A. Aller,** New York; **Charles K. Dunning,** Chicago, all newly created positions.

Charles R. Shinn, manager-special equipment, named assistant superintendent of transportation, Tacoma, Wash. **Richard L.**

Donald M. Wiseman
Milwaukee

Philip J. Cullen
Milwaukee

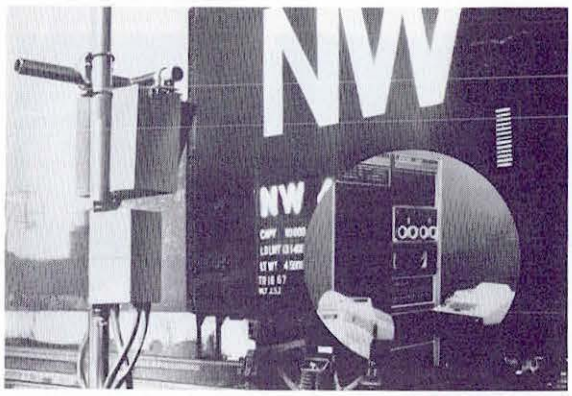
Saeugling, manager-general equipment, becomes assistant superintendent of transportation, Chicago. **Ralph W. Poor,** manager-transportation accounts, appointed assistant superintendent transportation accounts, Chicago.

Larry E. McDowell named manager-human resource planning; **Gracita K. Baltazar,** personnel officer-employment; **Barry K. Cornwell,** personnel officer-professional employment, all with headquarters in Chicago.

E.C. Jordan appointed division engineer, Twin City Terminal division, Minneapolis. **R.J. Brueske** named division engineer, Milwaukee division, Milwaukee. **G.D. Hayen** named assistant division engineer, and **V.L. Stoner,** assistant engineer, Chicago division, Bensenville, Ill.

MISSOURI PACIFIC.—**Toshitami Mori** appointed Far Eastern representative, Tokyo,

RAILCAR INVENTORY



This system integrates ACI scanners to dedicated mini-processors controlled by our software. The system delivers automatic data enhancement, execution of diversion instructions, prepares switch lists, maintains track inventory, and automatically prepares interchange and train consist reports. You'll save money many ways, including: reduced clerical costs, lower crew and per diem costs, and better car utilization.

We can have this system up and running in 120 days. It'll pay for itself 6 months after installation.

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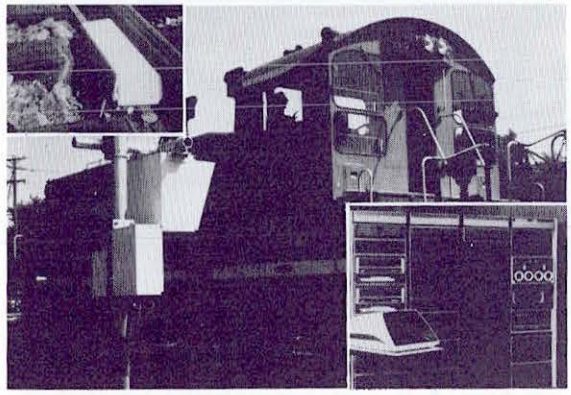
Circle 39 on reader service card

TERMINAL MANAGEMENT



Our Terminal Management Systems (TMS) keep you in control of dynamic operations and improve your return-on-investment.

These systems combine ACI scanners, wheel sensors, cardless communication devices, and dedicated mini-computers under unique program control. TMS automates your terminal or yard, produces repetitive waybilling (RWC) and data input, automatic track standing inventory, issues status changes and necessary reports, improves service scheduling, planning, and increases equipment and personal control.

We can have this system up and running within 12 months. We'll show you how to pay for this system within 9 to 12 months.

ACI Systems Corp.

Circle 40 on reader service card

to succeed **Norman W. Mikus,** who will be assigned a new post in the United States later this year.

PITTSBURGH & LAKE ERIE.—C. Roy Holley appointed general superintendent, Pittsburgh, succeeding the late **G.E. Mass. John E. Schomaker,** transportation superintendent, appointed special representative, reporting directly to the president. **Robert J. Wehrle,** trainmaster, appointed transportation superintendent, Pittsburgh.

Henry Farnsworth, chief estimator, appointed manager-industrial engineering. **John H. Tepe,** manager-industrial development, appointed manager of property development.

ROCK ISLAND.—Thomas I. Megan, general counsel, elected vice president and general counsel. **Richard M. Williams** named assistant general attorney.

John H. Henson named superintendent car department, Kansas City, Kans. **C.L. Bostic** appointed superintendent special equipment and loading practices, and **T.J. Garner, Jr.,** assistant superintendent-car, both with headquarters in Kansas City.

SANTA FE.—David P. Valentine, assistant general superintendent of transportation, Chicago, named general superintendent of transportation there, to succeed **Donald A. Baumgartner,** retired.

SEABOARD COAST LINE.—W.H. Andrews, Jr., assistant general freight agent, Jacksonville, appointed general freight agent-divisions there. **D.A. Boyette,** manager pricing, Jacksonville, appointed manager-routes & divisions there. **H.T. Harrell,** manager freight rate divisions, Jacksonville, retired July 31, after more than 47 years of service.

F.E. Childers appointed general agent, Brunswick, Ga. **C.H. Joyner,** general agent, Jacksonville, Fla., retired Aug. 31, after more than 42 years of service.

SEABOARD COAST LINE—LOUISVILLE & NASHVILLE.—Appointments at Charlotte, N.C.: **T.G. Lynch,** assistant vice president; **W.N. Goff,** assistant regional sales manager; **J.H. Vaughan,** district sales manager; **H.T. Wilkinson** and **H.B. Doster,** general agents.

SOUTHERN.—James O. Greenwood, superintendent, Tennessee Division, Knoxville, Tenn., appointed assistant vice president-security and special services, Washington, D.C., succeeding the late **Paul C. Shu.**

SOUTHERN FREIGHT ASSOCIATION.—J.O. Bond, office manager, Atlanta, Ga., appointed assistant to the chairman.

SOUTHERN PACIFIC.—Samuel B. Burton, assistant vice president, personnel department, retired after 33 years' service.

UNION PACIFIC.—Clifford Shoemaker, planning and scheduling supervisor for field engineering projects, named to the newly created position of crossing engineer.

WESTERN PACIFIC.—Thomas R. Gillett, Jr. named manager-industrial development planning. He was formerly industrial branch manager, **Grubb & Ellis Co.,** San Francisco.

WESTERN RAILROAD ASSN.—William J. Hardin named assistant tariff publishing officer, **Western Truck Line/Trans-Continental** joint freight tariff bureau.

TRANSIT

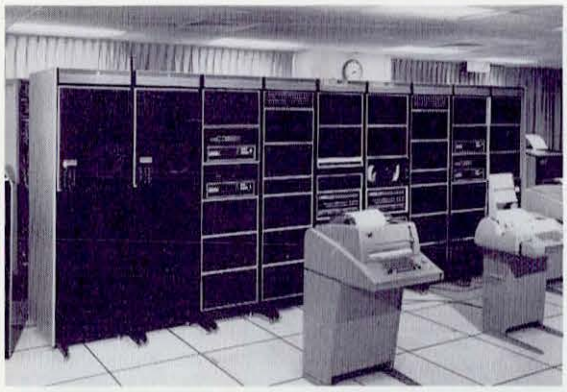
James A. Emery has joined the **Mass Transit Administration, Department of Transportation, State of Maryland,** as a public transportation development specialist, Public Transportation Development Division. Mr. Emery was formerly senior engineer with the consulting firm of Simpson & Curtin, Inc., Philadelphia, prior to which he was with the Patapsco & Back Rivers, the South Buffalo Railway, and the Lehigh Valley Transit Co.

Robert A. Snowber, vice president-transportation **Parsons, Brinckerhoff, Quade & Douglas,** has been appointed project director, **Kansas City Transit Associates,** for the transit study of the Kansas City metropolitan area.

Mrs. Judith T. Connor has been appointed special assistant to the administrator, **Urban Mass Transportation Administration, Department of Transportation,** Washington, D.C. Mrs. Connor had been director of the business policy analysis division, U.S. Department of Commerce.

Ms. Sallyanne Payton has been appointed chief counsel, UMTA Washington. She was formerly staff assistant to the President on the staff of the Domestic Council.

FRONT END PROCESSING



If you have 5 or more communication input/output devices terminating in headquarters or field message centers, we have the ANSWER to your message service and cost control problems.

Back-to-back front-end processors offer redundant communications switching control which can allow many data centers to release a large business machine from such service.

A single Front-end Processor (FEP) can be used to automatically handle message center switching and distribution of data normally handled by manual effort.

We will deliver such systems on a TURNKEY basis with a first year return on investment for you.

ACI Systems Corp.

MANAGEMENT INFORMATION SYSTEMS

The ULTIMATE in railroad car control and accounting. A real MIS package to manage your railroad by linking yards, terminals, and field locations to your corporate computer center.

This is what you've been waiting for: An MIS package that uses ACI scanners and CRT's for input of Repetitive Waybill Codes (RWC), Waybilling and data entry. This is the most modern system ever designed and is currently being placed in service on a Class I railroad. We will deliver it as a TURNKEY system with performance guarantees you can't resist.

We can have this system up and running in 18 months. You'll be surprised at how soon it'll pay for itself.

ACI Systems Corp.

Karl L. Mallette has been elected chairman, **Toronto Transit Commission.**

SUPPLY TRADE

James A. Miller has been elected president and chief operating officer, **Portec Inc. John S. Newton** has been elected chairman of the executive committee of the board and continues as chief executive officer of the company. Mr. Miller was formerly executive vice president.

Robert F. Anthony has been named vice president-marketing **Equipco Division, Unarco Industries, Inc.,** Chicago. Before joining Equipco Mr. Anthony was general sales manager, **General American Transportation Corp.,** Chicago.

Joseph W. Selden has been named president and chief operating officer, **Sands Measurement Corp.,** Dallas. **S.H. Raskin** has relinquished the post of president to become chairman of the board and chief executive officer. Mr. Selden was formerly chairman of the board, Crane Carrier Corp., Tulsa, Okla.

Roderick Craib, who was an associate editor of **Railway Age** from 1957 to 1962, has been appointed transportation editor of **Business Week.** He succeeds **Brenton Welling, Jr.,** who has been promoted to associate editor. Craib went from Railway Age to the **Reading,** where he served as director of public relations before joining Business Week in 1968 as assistant transportation editor. He was promoted to contributing editor in 1969. He is the author of a Picture History of United States Transportation, published by Simmons-Boardman. Since 1966, he has served as a coadjutant lecturer in English at Rutgers University.

James A. Miller
Portec

Robert F. Anthony
Equipco

Joseph W. Selden
Sands Measurement

Roderick Craib
Business Week

David M. Lyon, assistant chief engineer-advance engineering, **Electro-Motive Division** of **General Motors,** has been appointed to the newly created position of manager-overseas locomotive manufacture. **A.N. Addie,** manager-advance engineering, has assumed Mr. Lyon's former responsibilities.

The **Railway Products Division** of **Portec, Inc.** has named **Peter J. Wolf** sales manager, Philadelphia, and **Frank K. Semans,** manager-marketing, Oak Brook, Ill. **C.L. Bartley** has been named regional sales manager, Lake Elmo (St. Paul), Minn.; **P.A. Cavett,** Oak Brook, and **D.J. Corr,** San Francisco. Named district sales managers are: **G.V. Begany,** Buchanan, N.Y.; **Harold Childs,** Atlanta; **Raymond P. French,** Camden, Tenn.; **Mal H. Magnuson,** Spokane; **Paul A. Nelson** Kansas City, Mo.; **Thomas J. Mall,** Roanoke, Va.

Hal S.R. Stewart has been appointed corporate public relations manager, **North American Car Corp.** Mr. Stewart was formerly administrative assistant in public relations, **Johnson Outboards.**

Raymond L. Thomas, assistant district manager, **Edison Battery Division, McGraw-Edison Co.,** has been appointed district manager, Decatur, Ga. **William E. Huntenburg** has been named assistant district manager, Bloomfield, N.J.

(Continued on page 80)

DATA CENTER FACILITY MANAGEMENT

ACI Systems offers the only transportation time sharing computer system available for your use.

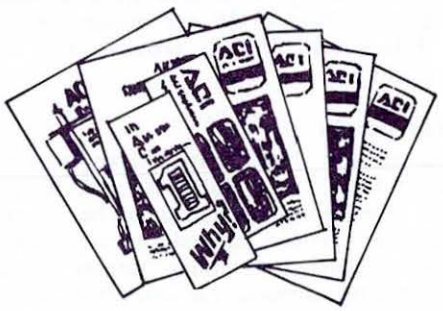
We will provide remote:
- **Computer time (360/40 - 262K - disk/tape - with FEP)**
- **Software Development Testing**
- **Computer service using your application programs**
- **Computer service using our library of application programs**

Let us show you how these services can provide immediate reduction in your data processing or manual accounting costs.

ACI Systems Corp.

Send for ACI literature now . . .

We'd like to put it all together for you!



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company _____

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ACI Systems Corp.

It has never been so urgent to train and upgrade employes ——or so easy!

. . . Or so inexpensive!

Home-study courses, tailored to the different needs of the maintenance-of-equipment department, can develop skilled journeymen from your present force of unskilled labor. It can cost as little as $6 per month per trainee. The Railway Educational Bureau provides the courses, and does the grading.

Many railroads use it!

The Bureau already has formal arrangements with about a third of the Class I railroads, and, with many industrial and other short-line roads. The completion of four-year courses qualifies apprentices as journeymen. Some roads use accelerated programs, turning out skilled machinists, electricians, carmen, car inspectors and other craftsmen in as little as three years. In the case of especially responsive students, two years is sufficient for the regular four-year course. Many other railroads use shorter REB courses for upgrading and refreshing. The Bureau also offers four two-year courses, as follows: Locomotive Engineers, covering diesel-electric equipment and air brakes; Locomotive Electrical Equipment; Locomotive Mechanical Equipment; and Car Inspectors and Carmen.

Railroads and trainees get feedback

Instructors of the Railway Educational Bureau, all active railroad men themselves, grade students' examination papers and make individual comments and suggestions to the students when such help is needed. In the case of formal, company-sponsored programs, the railroad gets a monthly report of each student's progress.

Who qualifies?

Any railroadman. Courses are written for employes with a high school level of education.

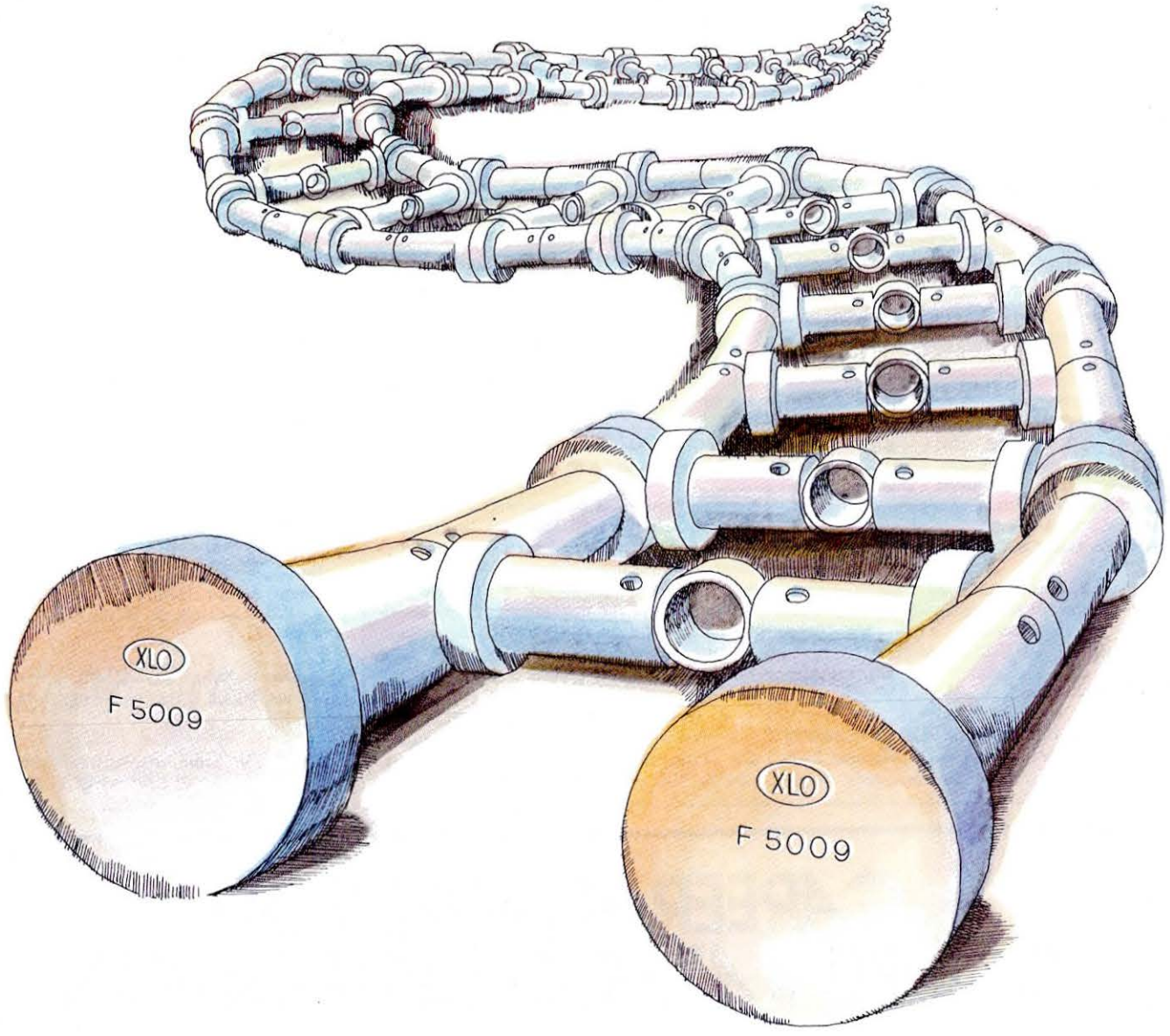
How to participate

Besides formal apprentice training programs on a contract basis, railroads may help an employe by paying half his monthly tuition, or all of it, or by reimbursing the employe on successful completion of his training. Or they may authorize payroll deductions.

For more information

Write now, or phone, Reid Kenedy, Railway Educational Bureau, 1809 Capitol Ave., Omaha, Nebr. 68102, telephone (402) 341-7889.

Railway Educational Bureau



The "F" pin. A million miles is only a milestone in its service to the rail transportation industry.

Connecting pins for clevises, levers and rods can be a rather ordinary purchased item. Unless they are "F" pins. Developed originally for railroad freight car use, these extraordinary pins are guaranteed by Ex-Cell-O for *one million miles of service.*

Each pin is formed of high-carbon steel, then induction hardened in its wear and load-bearing area to a depth of one-eighth inch. The head is stress relieved, cotter holes chamfered. Finally, it is coated to resist corrosion and to form a dry-lube break-in surface.

You simply install them and forget them . . . for the next million miles!
For the complete "F" pin story, contact XLO Railway Products, Accurate Bushing Co., Garwood, N. J. 07027.

XLO RAILWAY PRODUCTS

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XLO®
EX-CELL-O CORPORATION

Circle 41 on reader service card

(Continued from page 77)

John B. Morton, vice president, **Morton Manufacturing Co.,** Libertyville, Ill., has been elected executive vice president and secretary.

E. Fredrick Routledge has been appointed product marketing manager, railroad equipment product line, **Harris Controls,** Melbourne, Fla. Mr. Routledge was formerly technical sales manager, **Vapor Canada Limited,** Montreal.

Frederick L. Braun has been appointed supervisor of engineering, **Shippers Car Line Division, ACF Industries,** St. Charles, Mo.

Louis D. Davis, vice president of product engineering, **American Steel Foundries,** named vice president of manufacturing and product engineering. Mr. Davis assumes the manufacturing responsibilities formerly held by **Martin W. Kraegel,** who recently resigned.

Joseph W. Kvech has been named sales representative, **Southwest District, Union Tank Car Co.,** with headquarters in Houston. He was formerly supervisor of rail equipment, **Rohm & Haas Co.**

Joseph J. Celli has been appointed president of the international containerized shipping division, **Seatrain Lines, Inc.,** Weehawken, N.J. Mr. Celli joined Seatrain in June of this year as a corporate vice president-intermodal operations.

Vincent D. Burget has been promoted to Central District sales manager, **Harmon Electronics,** Grain Valley, Mo. **Mrs. Judy Campbell** has been promoted to sales coordinator. Joining the company are **W.E. Blevins** as sales representative, Western Region, and **Robert L. Danley** as applications engineer.

Pilot Packing Co., Inc., Sea Cliff, N.Y., and Barrington, Ill., has become associated with **Maher Engineering Co.,** Des Plaines, Ill., the midwest representative of **Soundcoat, Inc.,** Brooklyn, N.Y. The three companies will assist railroads in solving noise problems.

William J. Lifka has been appointed president, **Howe Richardson Scale Co.,** Clifton, N.J. Mr. Lifka was formerly president, Amphenol Connector and Controls Divisions.

Christopher T. Kastner has been named general manager, Communication Systems Business Division, **General Electric Co.,** Lynchburg, Va., succeeding **Richard P. Gifford,** named vice president-communications projects at Lynchburg. Mr. Kastner was also elected a vice president of the company.

R.B. Winsor has been appointed vice president, **IEC-Holden Ltd.,** Montreal. He formerly served as chief enginer, manager-sales development and manager-marketing. **W.M. Zacharkiw** has been appointed vice president and will coordinate the marketing and sales activities of maintenance of way products, new products development, assembly and plant activities and Lucas pollution control devices.

J. Donald Brinkerhoff has been elected vice president and general manager, **Shippers Car Line Division, ACF Industries,** St. Charles, Mo., succeeding **John S. Carlson,** who will continue to serve as a vice president of ACF at New York. Mr. Brinkerhoff formerly served as assistant general manager of leasing operations of the division.

Gerald Felise has been appointed regional marketing manager, **X-RAIL SYSTEMS, INC.,** Newark, N.J.

Jack C. Wende, sales representative, **Buffalo Brake Beam Co.,** Lackawanna, N.Y., has been named district manager-sales.

Stanley A. Evans, Jr., manager, transportation equipment and public utilities marketing divisions, **United States Leasing International, Inc.,** San Francisco, has been appointed a vice president.

Hudson Engineering Co., Hoboken, N.J., and the **Wilkes Co.,** Gerrardstown, W.Va., have been appointed representatives to handle the BICERA valve and associated products for **Penn-Troy Machine Co.,** Troy, Pa.

OBITUARY

Curtis B. Bennett, 75 retired assistant to president of the former **Nickel Plate** (now part of the Norfolk & Western), Cleveland, died Aug. 21.

Robert H. Morse, Jr., 74, retired president, **Fairbanks, Morse & Co.,** died Aug. 10 in Palm Beach, Fla.

George N. Sabin, assistant vice president rates, **Lehigh Valley,** New York, died July16.

CAREER APPAREL FOR CORPORATE CONSIDERATION

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***DuPont registered trademark**

Why the railroad pros are pro AMER-Kleen:

If paper filter service life in month is . . .	. . . then the annual cost of paper elements equals . . .*	. . . plus additional fuel cost . . .**	. . . totals annual paper filter cost including fuel . . .	. . . resulting in annual savings with AMER-Kleen.***
4	$1,110	$160	$1,270	$1,010
5	888	160	1,046	786
6	740	160	900	640
7	634	160	794	534
9	493	160	653	393
10	444	160	604	344
12	370	160	530	270
15	296	160	456	196
21	211	160	371	111
33	135	160	295	35
44	101	160	261	1

*Paper filter costs based on $370 per change.

**AMER-Kleen operates at 4" less resistance for an additional annual fuel savings of $160.

***AMER-Kleen cost based on scheduled 3-month maintenance (four changes per year at $65 per change—$260 per year).

Figures shown for SD-40/SD-45 Locomotive.

Whether you're specifying original equipment or converting existing locomotives, AMER-Kleen cartridges can save you hundreds of dollars per year per locomotive.

Not only are AMER-Kleen replacement costs lower than paper, but AMER-Kleen can save an approximate 1600 gallons of fuel, or about $160.00 per year per locomotive, when used in place of paper filters. This is based on the fact that AMER-Kleen operates at 4" less resistance than paper and, since higher resistance takes horsepower away from tractive effort, significant fuel savings are realized.

When you combine fuel and replacement savings, it takes a paper filter service life of 44 months just to *break even* with the cost of an AMER-Kleen.

For complete information on how much your road can save with AMER-Kleen, write: Manager, AAF, Railroad Products and Systems, Dept. 111, Box 1100, Louisville, Kentucky 40201. In Canada: 400 Stinson Blvd., Montreal 9.

Better Air is our Business.

AAF American Air Filter
RAILROAD PRODUCTS

Circle 42 on reader service card

New York launches an aerial attack or

Two years ago, New York's Metropolitan Transportation Authority enlisted 'copter cops in its war against crime and vandalism on railroad rights-of-way. As of late August, 2,200 flying hours had been logged by the two Bell helicopters which MTA leases from Decair Helicopters, Inc. and the sky patrol experiment was described as having achieved "considerable success."

Said MTA: "Certain incidents of crime and vandalism have decreased on both the LIRR and Penn Central. A number of arrests have been made by the chopper police and ground forces for the dangerous practice of tampering with railroad switches, signal and track circuits, and the placing of obstructions on tracks. There has also been a decrease in broken train windows and fewer stonings of trains; the helicopter surveillance program has effectively prevented serious accidents by landing to remove obstructions from tracks, alerting approaching trains of vandalism, ejecting and warning trespassers of the dangers of walking, playing or riding mini-bikes or motorcycles along the railroad's right of way, as well as spotting and reporting fires."

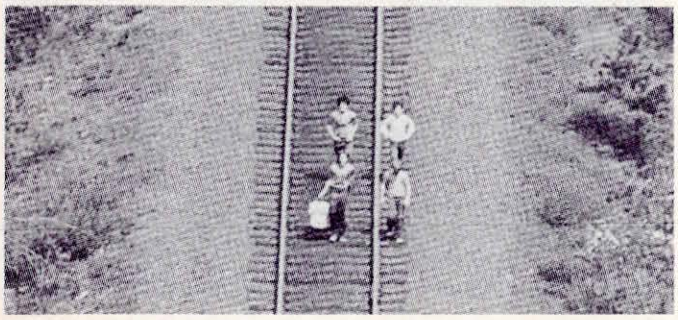
LIRR's helicopter works out of MTA's Republic Airport at Farmingdale, L.I., and covers 334 miles of tracks from the Atlantic at Montauk to the East River at Long Island City. Penn Central's 'copter is based at Ramapo Valley Airport in Spring Valley, N.Y. It patrols as far north as Croton-Harmon on the Hudson Division, Beacon and Brewster on the Harlem Division, and Port Chester on the New Haven, including the highly vulnerable areas of North White Plains and Port Chester, where many commuter cars are stored when not in service. ■

LIRR POLICEMAN James Thomson and Pilot Dennis Howard prepare for daily patrol.

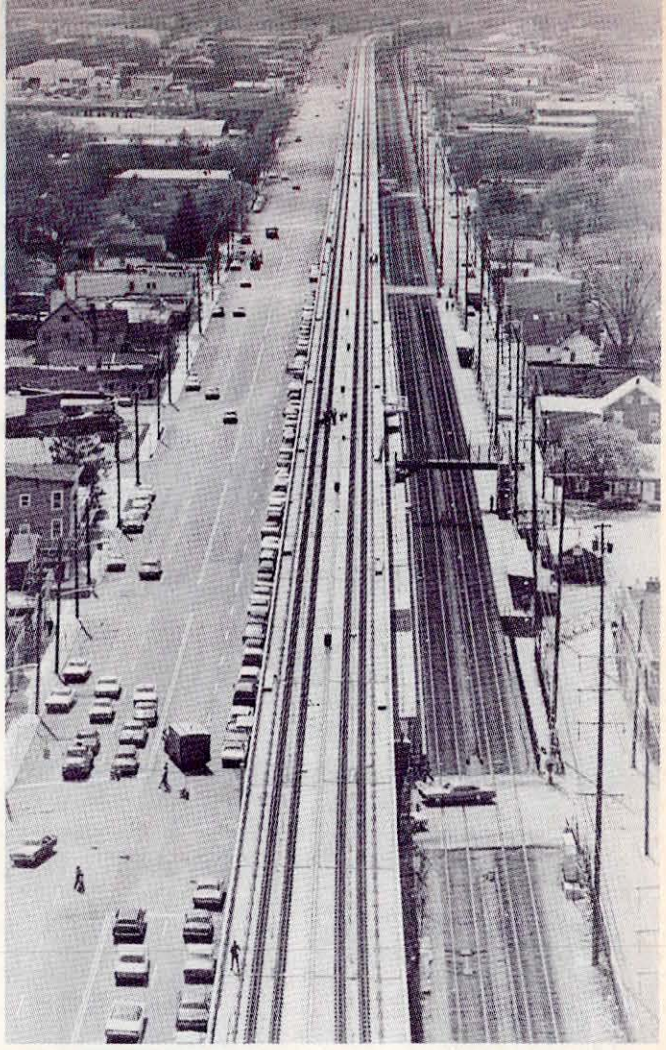
JAMAICA STATION, an important junction for LIRR commuters, is checked out by low-flying chopper. Assignments are radioed to 'copter from police headquarters.

railroad vandalism

SUFFOLK COUNTY 'copter cop checks flight patterns with LIRR's Thomson. Rail and local police work closely together.



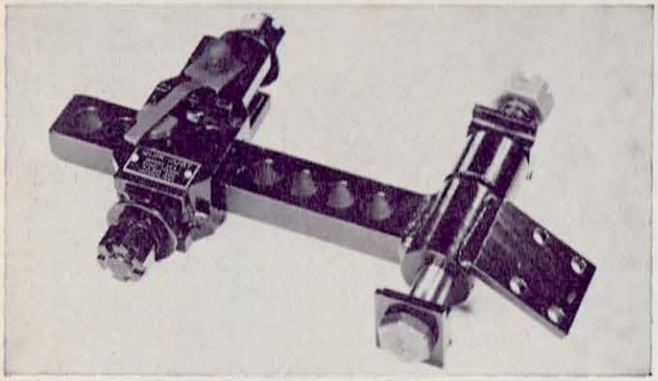
RAILS ARE MAGNET for out-of-school kids. These are startled by order from 'copter loudspeaker, "Get off the tracks."



LINDENHURST elevation as seen from chopper. When trespassers are spotted, 'copter crew summons radio police car.

AFTER LIRR GROUND POLICE are contacted from the air, helicopter sets down to team up with waiting patrol car in joint efforts to apprehend or eject trespassers from railroad property. MTA's aerial surveillance also covers Penn Central commuter tracks.

Touchstone wants to save labor. YOURS.



QUIK-JUST

LOCOMOTIVE BRAKE ADJUSTERS

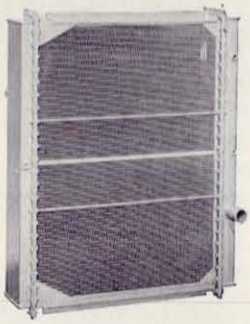
NEW SLIDE BAR AND LOCK PIN STYLE. REPLACES OLD SCREW TYPE

PULL ROD STRAPS

FOR ALL TYPES OF LOCOMOTIVES

TOUCHSTONE-GENERAL

LOCOMOTIVE
RADIATORS



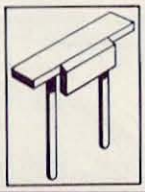
QUIK-DUMP

HONEYWAGON

ENVIRONMENTAL CONTROL SERVICE EQUIPMENT FOR LOCOMOTIVE AND CABOOSE TOILETS

QUIK-FIX

FOR QUICK REPAIR OF
LOCOMOTIVE HOOD DOOR LATCH



TOUCHSTONE - GENERAL
Radiators for Locomotives
Sales & Service

TOUCHSTONE

Railway Supply & Manufacturing Co.
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EXCLUSIVE DISTRIBUTORS TO RAILROADS FOR
DOUBLE SEAL PISTON RINGS
AND
SUPER AIR COMPRESSOR PISTONS

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Bring railcars in when you need them, spot them where you want them and

get them out to the railhead at the time when it's convenient for you.

These are the reasons that leading rail shippers are handling their in-plant movements of railcars with Whiting Trackmobiles®. "The convenience and safety of using Trackmobiles comes home to you every day," says one shipping executive whose company operates 19 Trackmobiles. "For safety's sake, we pull all cars in and out of our plant. We can do that because Trackmobiles aren't tied to the track. The road wheels are big time savers."

There's a Whiting Trackmobile model to speed car handling around your plant whether you move one car or one hundred. Call or write Whiting for Bulletin T-148. (312) IN 8-9400.

WHITING CORPORATION
Harvey, Illinois 60426 U.S.A.

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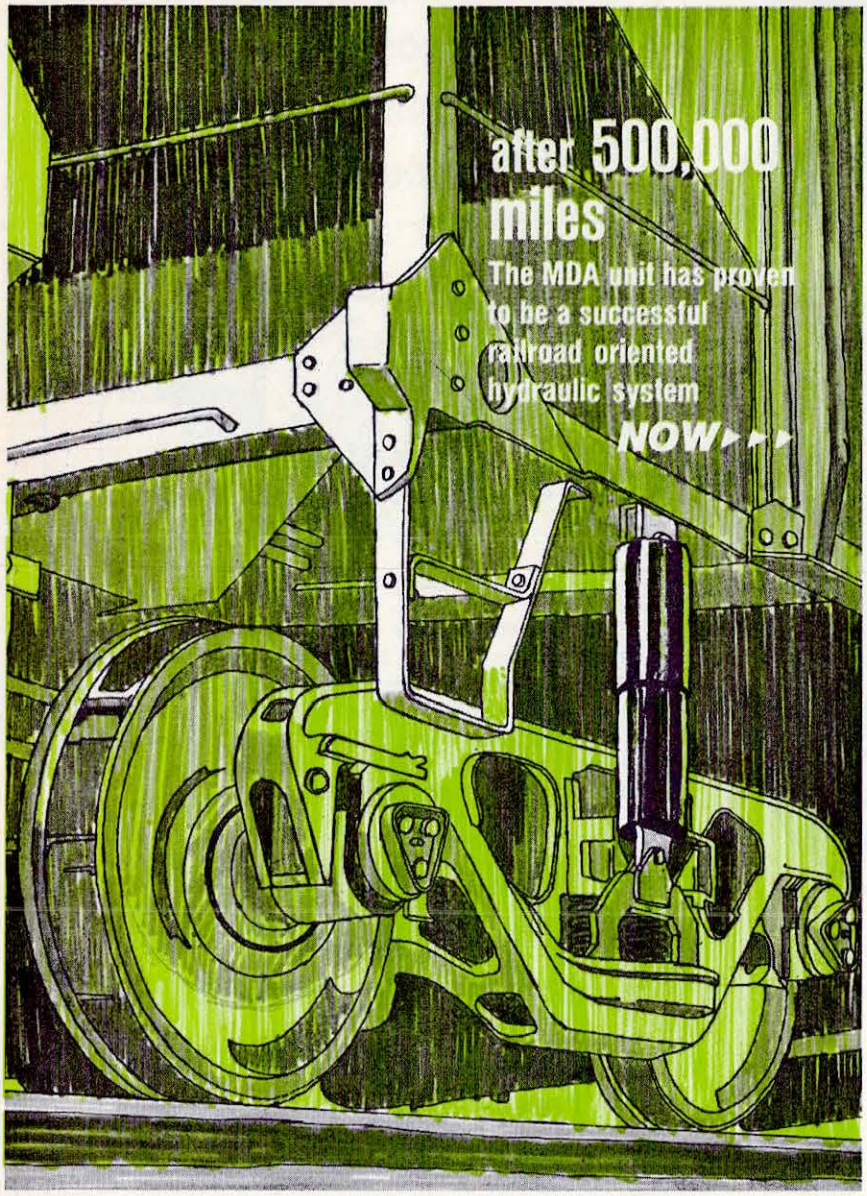
INNOVATION THROUGH IMAGINATION



With this established design and operation experience, Railroad Dynamics introduces the MDA Control/Master unit, an alternate means of introducing hydraulic damping into the freight car.

...solution to the overall freight car vibration problem

The MDA Control/Master unit is a single acting, hydraulic damping system, operating in compression only, which is placed directly in the center of the truck spring group, replacing the spring combination at that location, making its presence on the car nonapparent. This newest version of the MDA concept, being the same size as an outer coil truck spring, requires no physical attachment to either the side frame or bolster, and therefore, it can be applied as simply as a truck spring.

MDA

MOTION DAMPING ASSEMBLY

RAILROAD DYNAMICS, INC.
NEWTOWN SQUARE, PA.

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Try Lix

If you haven't tried Lix Diesel Cleaners in your shop you're missing part of the action. We mean the **action** which you get when you use Lix Cleaners.

There are Soak Tank Cleaners for diesel parts that remove any and all soil . . . even tough, burned-on carbon. And all metals can be cleaned in the same tank at the same time. There are Spray Type Cleaners for running maintenance, electrical equipment, surface wipe-down, etc. . . and cleaners for use in your Automatic Washrack that leave surfaces clean and film free.

Each Lix Cleaner is especially formulated to do a superior job at an economical price. Try Lix Diesel Cleaners. They're made for you.

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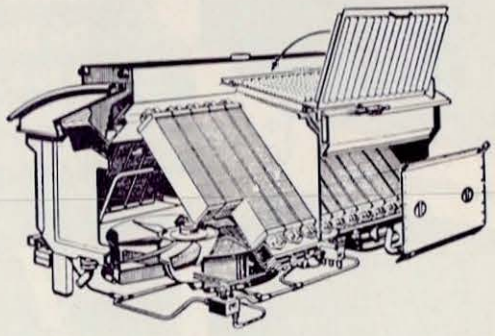
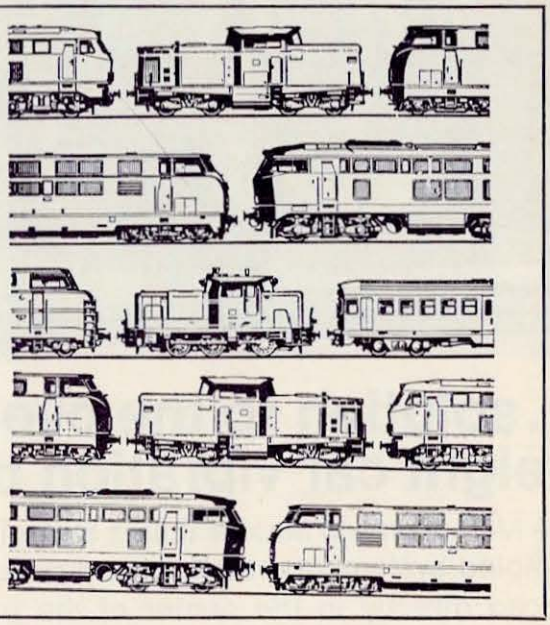
BEHR

Cooling Units with Hydrostatic BEHR Fan Control System in Railbound Vehicles



The illustration shows a BEHR top-mounted unit for the DB Type 218 (V 164) Diesel locomotive used in travel and cargo service. This model features a primary and a secondary circuit with cooling outputs of 1,000,000 kcal/h and 304,000 kcal/h, respectively, An engine power of 2,400 hp at 1,500 rpm permits a maximum speed of 120 km/h.



For full information on our range please ask for our brochure "BEHR Cooling Units with Hydrostatic Behr Fan Control System".

SUDDEUTSCHE KUHLERFABRIK JULIUS FR. BEHR
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Circle 48 on reader service card

Would you like the "inside dope" on train performance?

This is now entirely feasible with LEIGH INSTRUMENTS' Data Acquisition and Recording System (D.A.R.S.). This system, designed specifically for the rugged environment of rolling stock, collects and records a wide range of operational information that can be vitally important to the demanding requirements of modern railroad management in the 70's.

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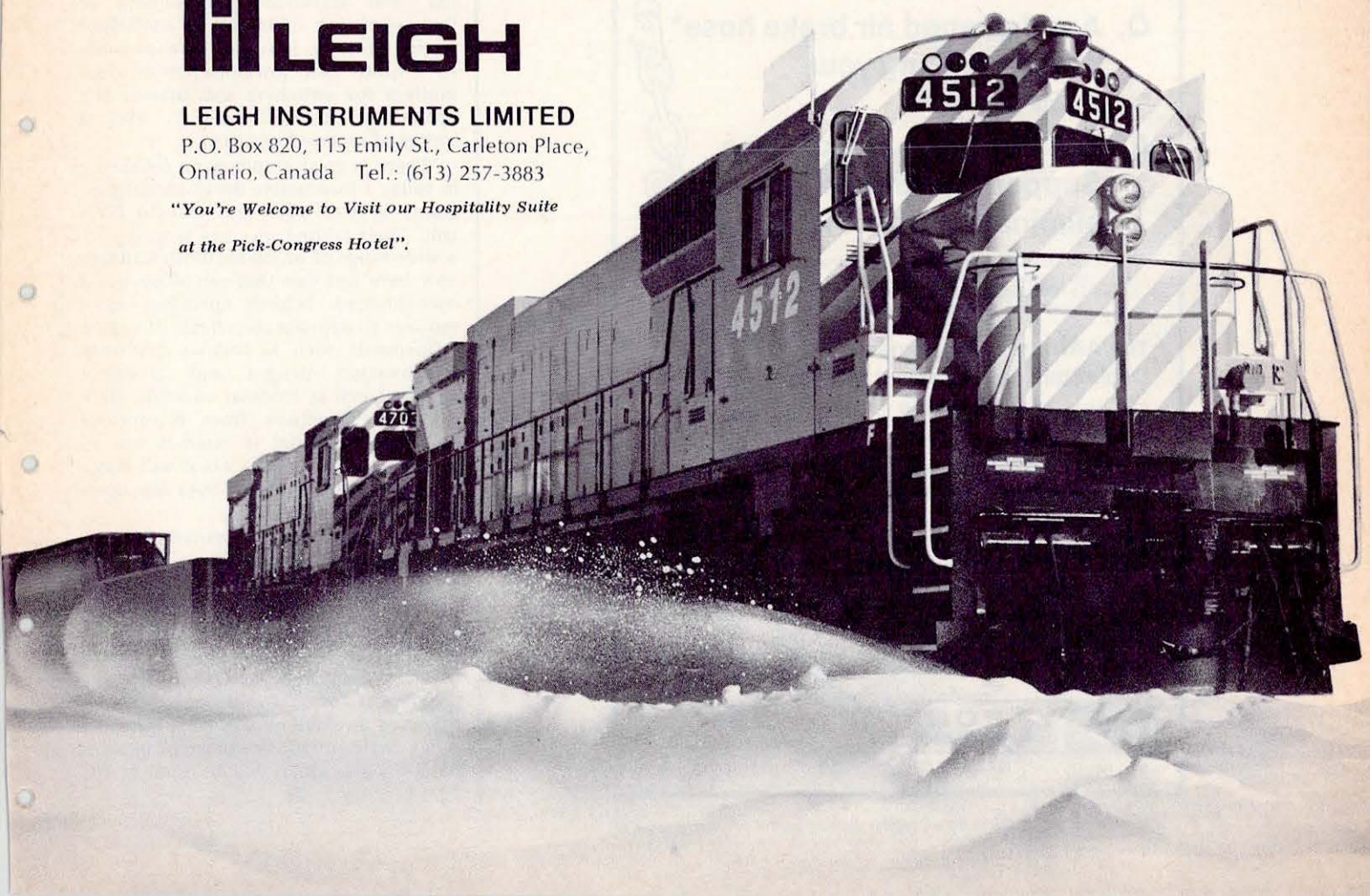

Beating odds in rolling stock design

(continued from page 70)

first time outnumber plain journal bearings under American freight cars. At the end of 1972 there were 782,510 cars with roller bearings. An additional 70,000 cars will go into service with roller bearings by the end of 1973. The first large-scale roller bearing installations began in 1954.

The laboratories of Timken Roller Bearing must get a substantial amount of the credit for the performance of today's roller bearing. Timken continues to refine its tapered roller design and right now is looking over the first performance reports of road tests with its new XP long-life journal bearing designed to operate 600,000 miles, or ten years, with no periodic lubrication or removal for inspection.

In the field research program leading to development of the XP bearing, Timken investigated 27,000 cars in an 18-month period to determine the reasons for car set-outs in yards, as well as from trains. Loose and leaky seals were the leading cause of overheated bearings. It was to this area that particular attention was given. Timken had to depend on input from its customers to determine the areas that required special attention when it came time to improve its AP bearing.

The conversion of the freight-car fleet to roller bearings, now half complete in two decades, is taking place at a far slower pace than did the replacement of steam locomotives with diesels, a process that required essentially a single decade. Here, the pioneering of Electro-Motive must be given most of the credit. Dieselization's second generation is currently at the mopping-up stage with most attention now being given to locomotives economically viable in marginal services. While this has seen considerable rebuilding of first-generation units for an additional service lifetime, it is also now possible to acquire new low-horsepower locomotives for switching and branch line operations. Electrification is also a source of renewed research.

There is great emphasis on reliability in today's locomotive development programs at both EMD and General Electric. Their laboratories are working on a wide range of problems. Both builders now have test cars that can be operated over-the-road behind operating locomotives to appraise the effects of engine refinements such as today's improved combustion designs and electrical changes such as modular controls. Here again the feedback from locomotive owners is essential if builders are to produce the equipment which will maximize the profitability of both the operator and manufacturer.

The AAR recently noted that research and testing are, perhaps, more difficult for railroads than for some other industries because of the long-term nature of railroad investments in equipment and plant. A locomotive is expected to remain in service for 15 years, a freight car for up to 40 years. "Thus," observed an AAR spokesman, "research being carried on today can result in some components which will be used in the 21st century." ■

ROAD TESTING is necessary in appraisal of new locomotives and new locomotive components. EMD test car is often seen behind builder's unit hauling revenue trains.

Q. Are damaged air brake hose* chains causing your train delays?

A. The Vapor Air Brake Hose Support Spring will help eliminate the problem!

* "Air hose parting perhaps, is the greatest single item for train delays . . ."
Car Department Officers Association Meeting
Report RSA, Chicago, September 18, 1972

The AAR Brake Equipment Committee has approved 10,000 car sets in interchange service with the Vapor Air Brake Hose Support Spring for test and observation.

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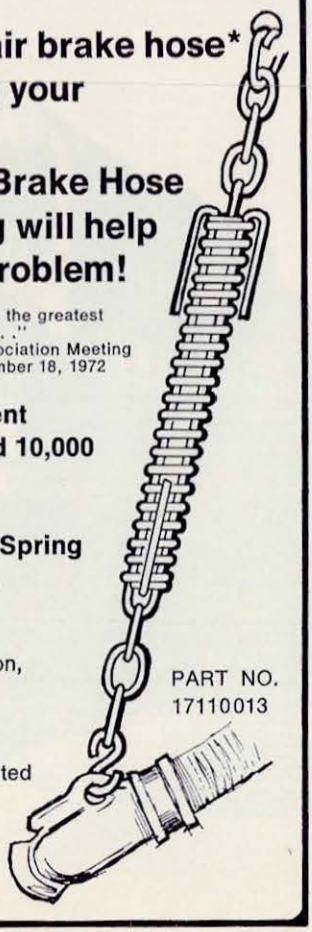

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Versatility—The IE831-800 has the compact size, low weight and minimum vibration characteristics to meet a variety of applications. To name a few: emergency standby power, continuous electrical generator sets, oil well drilling, pumping stations, total energy systems, railcar propulsion, refrigeration, gas and air compressors, process plants, and marine auxiliary power.

Performance—Design experience means simplicity, ruggedness, easy maintenance and economical power, too. The IE831-800 delivers 690 shaft horsepower (continuous, at 59°F. at sea level).

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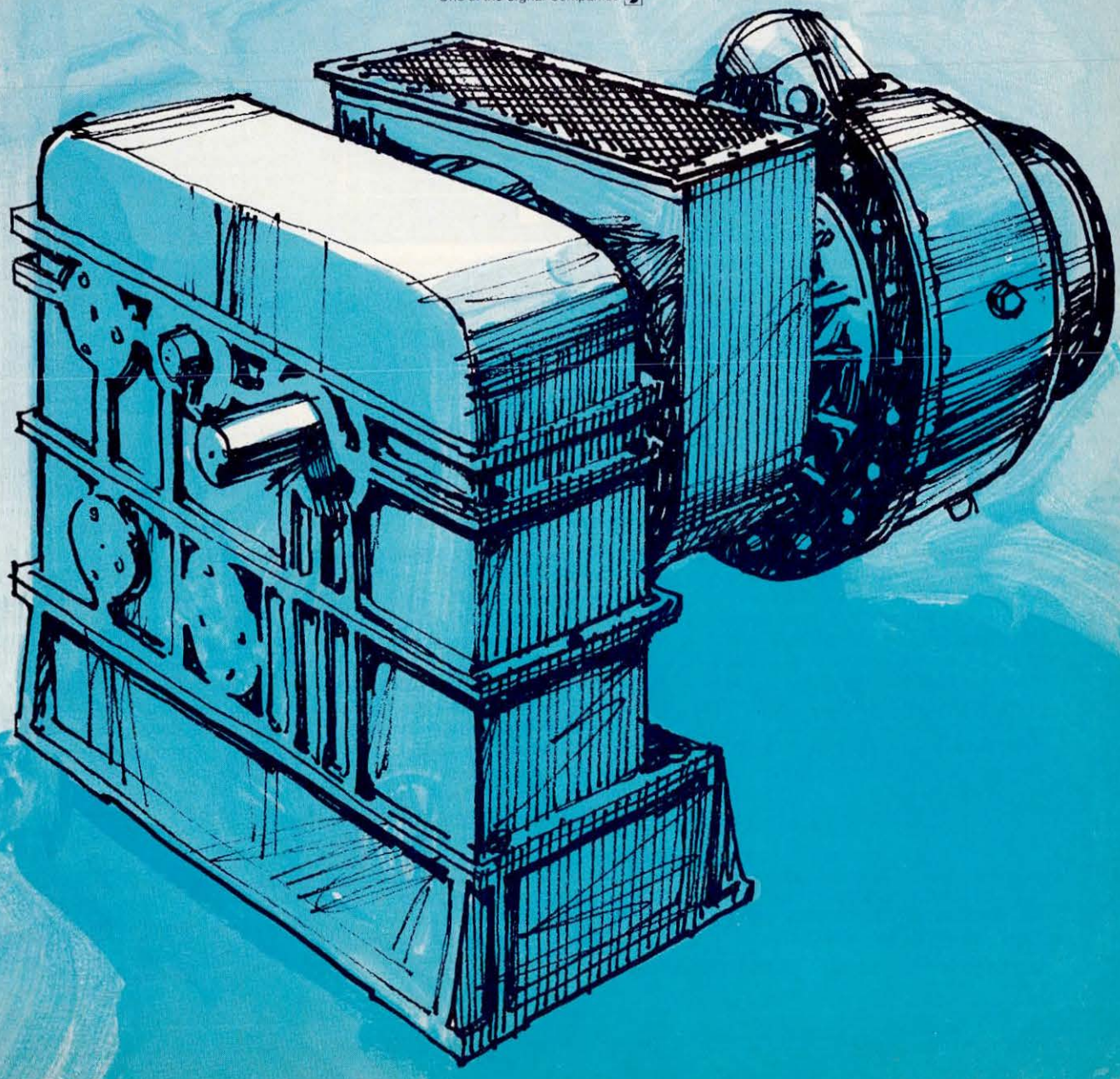
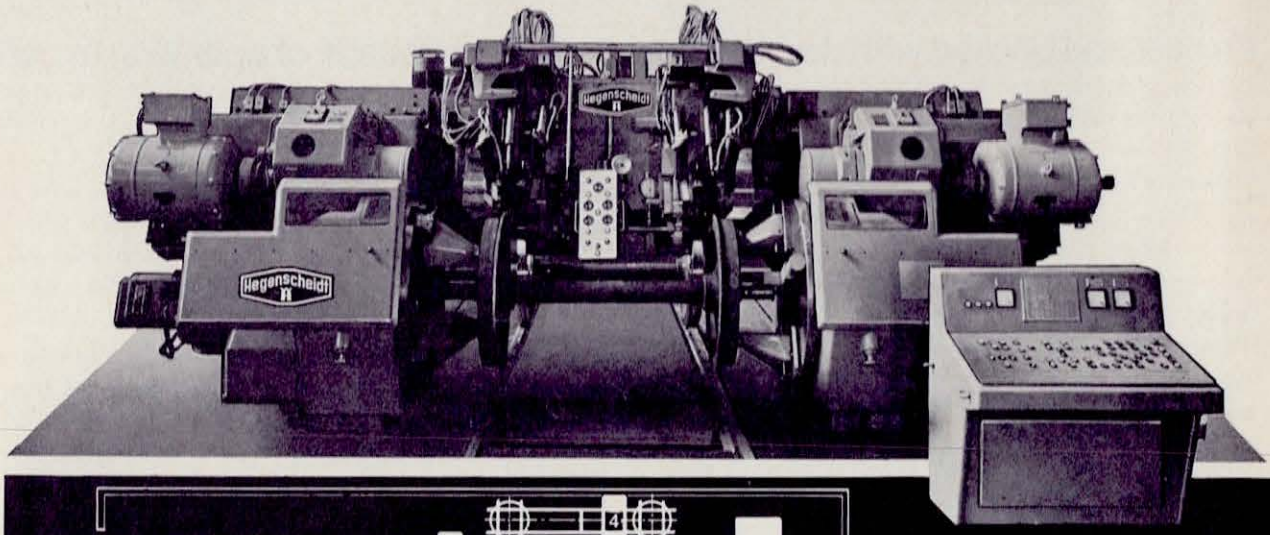
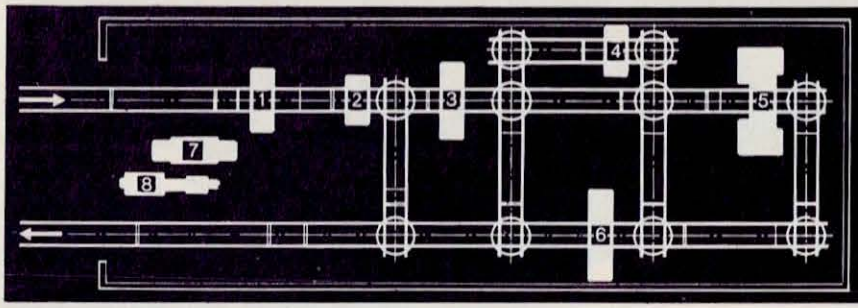


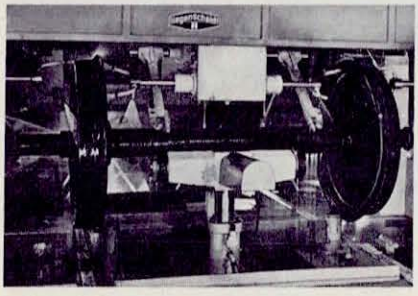
For progress of wheel and rail

HEGENSCHEIDT Wheel set reconditioning lines





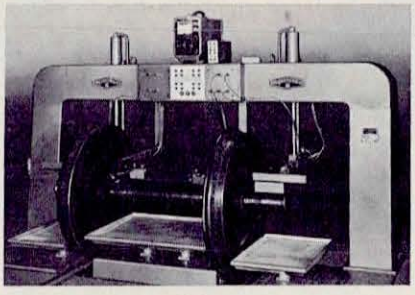
Pos. 1 Pressure-water operated cleaning plant for wheel sets
Pos. 2 Ultrasonic crack detecting machine
Pos. 3 Optical measuring machine
Pos. 4 Flange welding machine
Pos. 5 Automatic portal-type wheel lathe
Pos. 6 Axle journal turning & roller burnishing lathe
Pos. 7 Roller bearing mounting/demounting press
Pos. 8 Pressure-water operated cleaning plant for bearing boxes & small parts



We develop for the railways of the world

For wheel set reconditioning we manufacture proven special purpose machines. As the oldest established firm in this field we can offer more than 80 years of knowledge and experience. Because of excellent design many Hegenscheidt machines have won the world market. Our international character is emphasized by a world-wide net of agencies, subsidiaries in USA and South Africa, licensees in USA, India and Brazil.

VRa 003/73 e



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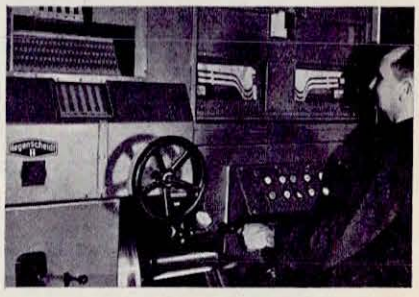

Wheel set reconditioning lines

For improved economy in wheel set reconditioning we have developed efficient shop floor transport systems for operation in conjunction with our proven range of wheel set machines. This combination guarantees the best wheel set flow and a maximum in wheel set accuracy and quality. Our team of experienced engineers is available to carry out project studies and submit complete plans for reconditioning lines.

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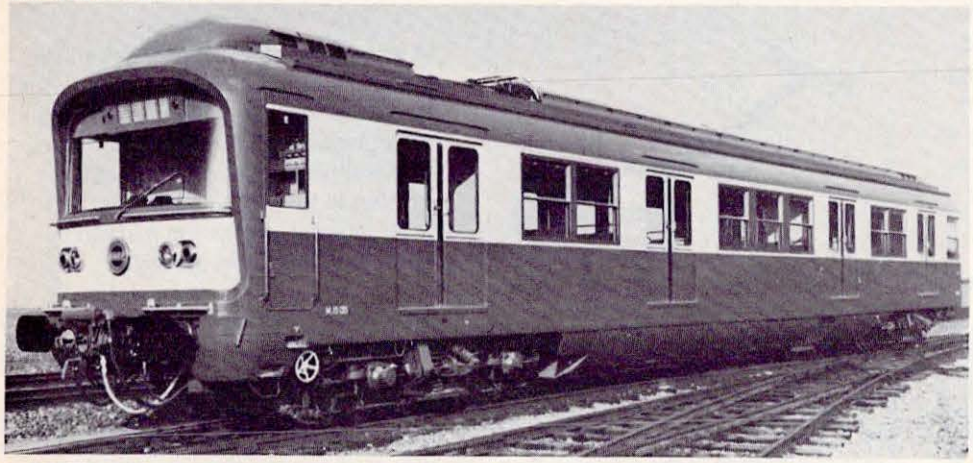
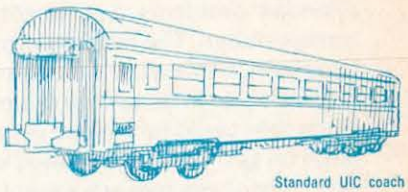
Motor coach for Urban Transit

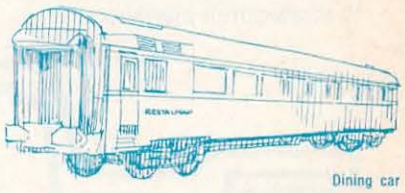


Freight car with sliding roof

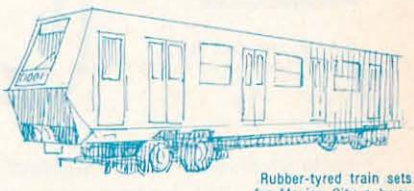
Heavy crew trolley



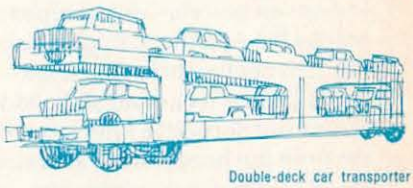
Standard UIC coach



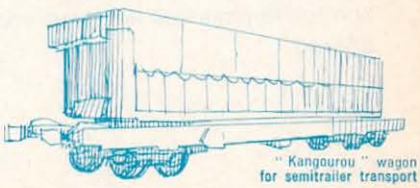
Dining car



Rubber-tyred train sets for Mexico City subway



Double-deck car transporter



"Kangourou" wagon for semitrailer transport

Design and construction of rolling stock has always been the foremost activity of CIMT LORRAINE.
In order to find the best solutions to today's transport problems in passenger movement and freight handling, CIMT LORRAINE has set up its own R & D department.

More than 100 types of special wagons, passenger coaches, crew trolleys and subway cars have been designed and built at our works. Now, several thousands of rolling stock units are in service with SNCF, RATP and overseas administrations.

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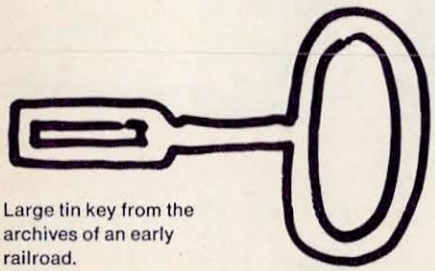
Petroleum and You (A History of the Former)

Chapter Four: Growth at Home, Expansion Abroad

Total U.S. output in 1859, the year of Drake's Titusville well, was an estimated 2,000 barrels, yet in just four years that figure had climbed to an astounding 3,000,000, and would have soared even higher if the industry had not insisted on using such large barrels.

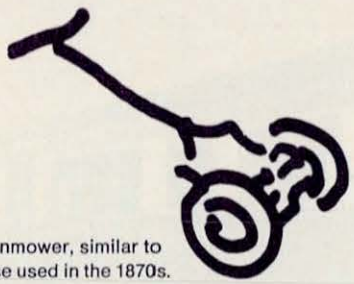
With increased production came attendant problems of shipment and transportation. The tank car proved beneficial in this area, although early models came in for severe criticism since they could be opened only by a large tin key, and once opened were no longer of any real use except as rhododendron planters.



Large tin key from the archives of an early railroad.

Pipelines also came into widespread use, and in 1861 the first cargo of oil—in wooden barrels—was shipped across the Atlantic to England aboard the 19th century brig "Elizabeth Watts." Upon its arrival all London turned out decked in finery to greet the tired but happy crew, sparking a mood of infectious revelry and spirited hi-jinks that left hundreds injured.

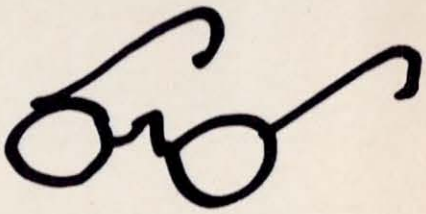
Then in the decades following 1870 a small group of American businessmen with bulldog determination transformed the petroleum business from a lusty infant into an indispensable sinew of this country's industry, an accomplishment even more impressive when one takes into account the fact that many of them still found time to work in the yard.



Lawnmower, similar to those used in the 1870s.

In the meantime the industry was proceeding apace in other parts of the globe. The 1870s saw the development of oil fields in the Caspian Sea region, and it was here that the first tanker was put into service. Built in 1879, it was christened the "Zoroaster," after an ancient Persian prophet who, ironically enough, had always maintained that petroleum should be left where it was.

And in 1884 in far-flung northern Sumatra natives looked askance as an enterprising Dutchman, Jans Zijlker, set up a crude drilling rig. In fact, even after he had struck oil and established a prosperous company they continued to look askance, and it was not until 1932 that this was properly diagnosed as a mild form of astigmatism.



Effective cure for looking askance in northern Sumatra.

A British merchant, Marcus Samuel, began shipping oil from Russia to the Orient in 1890, and eventually merged his concern with the Dutch company. The Rothschilds were originally a partner in the venture, but later sold their interest, preferring instead to keep their money in money.

Throughout this period petroleum continued to be used primarily as an illuminant. But with the turn of the century came a quaint invention called the horseless carriage which was to shake the industry to its very foundations. (See forthcoming chapter entitled: Foundations, Water Seepage, And How They Affect Personal Hygiene.)

This is the fourth chapter in a seven-part series presented as a salute to the industry. In addition we would like you to know that we offer a full line of lube oils, greases, cutting oils, fuels, motor oils, white oils, LP-Gas, and specialty products, with a complete network of service facilities.

For further information and for a booklet of all seven chapters of the *Petroleum and You* series write to Mr. Frank Laudonio, Atlantic Richfield Company, P.O. Box 71169, Los Angeles 90071. (You might also indicate any product interest and your business.)

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Market Outlook

CARLOADINGS

Loadings of revenue freight in the week ended Aug. 18 totaled 540,249 cars, according to the Association of American Railroads. This was an increase of 6,787 cars, or 1.3%, compared with the previous week, and an increase of 22,221 cars, or 4.3%, compared with the corresponding week last year. Ton-miles generated by carloadings in the week ended Aug. 18 are estimated at 16.1 billion, an increase of 6.5% above the corresponding week of 1972.

REVENUE FREIGHT CARLOADINGS

Commodity	Aug. 18 week	Aug. 11 week
Grain	34,362	35,860
Farm products	8,491	8,238
Metallic ores	47,570	42,888
Coal	91,893	91,733
Crushed stone, gravel & sand	33,273	33,868
Nonmetallic minerals	17,037	16,483
Grain mill products	20,492	20,164
Food and kindred products	23,424	22,227
Primary forest products	24,752	25,459
Lumber & wood products (except furniture)	17,375	16,931
Pulp, paper & allied products	23,081	23,181
Chemicals & allied products	26,175	25,652
Petroleum products	9,607	9,715
Stone, clay & glass products	21,865	22,117
Coke	8,258	8,727
Metals & products	24,696	25,307
Motor vehicles & equipment	17,894	16,568
Waste & scrap materials	15,622	14,701
Forwarder & shipper assn. traffic	10,151	10,014
All other carloads	63,747	62,233
LCL traffic	484	491
Total cars loaded	**540,249**	**532,557**
Cumulative total, 33 weeks	1973	1972
	17,136,532	**16,198,131**
Estimated revenue ton-miles (billions) 33 weeks	524.7	484.3

PIGGYBACK LOADINGS

U.S. piggyback loadings for the week ended Aug. 11 totaled 28,660 cars (14.7% above the corresponding week last year) and 50,095 trailers or containers (up 18.8% from 1972). Cumulative volume for the first 32 weeks of 1973 is 924,925 cars (up 17.7% from last year) and 1,598,982 trailers or containers (up 21.3% from 1972).

IN CANADA

7 days ending	Tons of Revenue Freight	Cumulative Totals
Aug. 7, 1973	4,130,561	142,914,102
Aug. 7, 1972	3,335,456	121,926,560

● *Borg-Warner, Marbon Division.*—Leased 85 5,852-cu-ft-capacity covered hopper cars from North American Car for movement of Cycolac ABS thermoplastic.

● *Emons Industries.*—Ordered 100 50-ft, 70-ton general service box cars from Berwick Forge & Fabricating Division for service on the Maryland & Pennsylvania, an Emons Industries subsidiary. The cars will have 10-ft sliding doors and nailable steel flooring.

● *New York City Transit Authority.*—General Railway Signal will furnish and install automatic block signaling and automatic train stop equipment on NYCTA's Jerome Ave. line. The contract, valued at $6.3-million, calls for equipping about 7.5 track miles (2.5 miles of three-track line). Installation will be handled by a GRS subcontractor.

● *Trailer Train.*—Ordered 454 89-ft, 4-in. standard level flat cars from Bethlehem Steel (214), and Pullman-Standard (240); also, ordered 363 60-ft flat cars from Thrall.

● *Freight-car orders and deliveries.*—The following report has been received from the AAR and ARCI:

DELIVERED

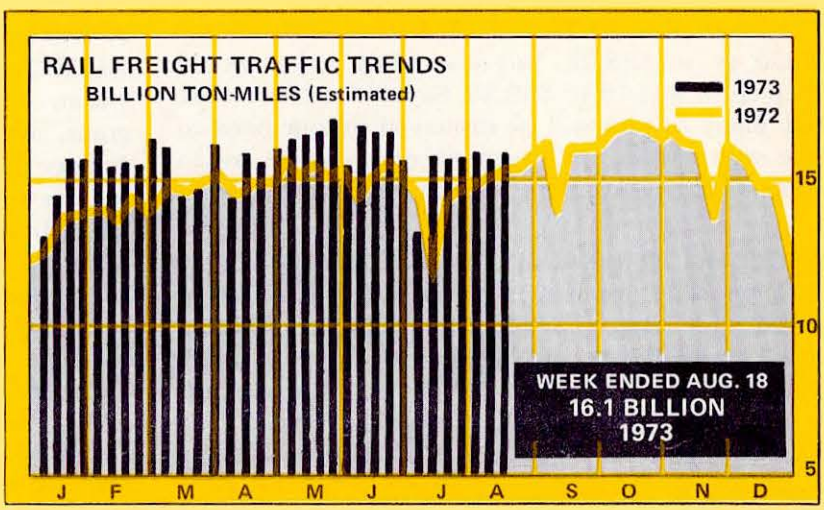
	July '73	June '73	July '72
Built new by carbuilders	3,466	4,414	2,295
Built new in R.R. shops	261	233	549
Built new—total	3,727	4,647	2,844
Rebuilt	58	39	125
TOTAL DELIVERED	**3,785**	**4,686**	**2,969**

ORDERED

To be built new by carbuilders	5,282	10,964	2,711
To be built new in R.R. shops	300	700	221
To be built new—total	5,582	11,646	2,932
To be rebuilt	—	—	−68
TOTAL ORDERED	**5,582**	**11,664**	**2,864**

ON ORDER AND UNDELIVERED

	Aug. 1, '73	July 1 '73	Aug. 1 '73
To be built new by carbuilders	43,189	41,600	12,340
To be built new in R.R. shops	2,908	2,869	4,687
To be built new—total	46,097	44,469	17,027
To be rebuilt	308	366	1,906
TOTAL ON ORDER	**46,405**	**44,835**	**18,933**



Source: Association of American Railroads

Moving People

DENVER DISPLAYS PRT PROTOTYPES

More than a dozen PRT (personal rapid transit) systems are now or soon will be on the market—and four of them were on display early in September in Denver, which is considering putting in nearly 100 miles of PRT routes in a combined bus/rapid transit system. On display were vehicles made by Ford Motor Co., Transportation Technology, Inc. (TTI), the Boeing Co., and Ling-Temco-Vought (LTV).

FORD PRT SYSTEM FOR HARTFORD AIRPORT

Ford Motor Co. will build a 7/10-of-a-mile PRT system at Bradley International Airport near Hartford, Conn. It will shuttle passengers between a parking lot and the terminal building (with an intermediate stop at a motel) and also give the Connecticut Department of Transportation a working system to study for possible wide-scale use within cities. The system will involve automatically-operated, rubber-tired, 24-passenger vehicles moving on a concrete guideway. Ford won the demonstration contract in competition with Bendix, Boeing, Westinghouse Electric, TTI, Rohr, and North American Monorail. The entire cost of $4.4 million is being picked up by the State of Connecticut from a public service tax which has also been used to help pay for new railroad commuter cars.

FOR ICG COMMUTERS, A NON-ELECTRIC SHOCK

Facing a loss of as much as $6 million on commuter service this year, Illinois Central Gulf is going after a fare increase—in a range that goes up to 132%. And in this case, ICG—which has been waiting since January for Illinois Commerce Commission action on an earlier fare-boost plea—is going to the Interstate Commerce Commission. Proposed increases in ICG's zone-fare system vary widely. For farthest-out commuters, for example, a $1.55 one-way ticket would go to $1.70. A $33.40 25-ride ticket would go to $38.25. But a monthly ticket would jump from $34.15 to $62.25. Says ICG: "We realize that many of you will be dismayed by our need to take such action, but we must do so if we are to continue to operate the ICG commuter service."

SEPTA CARS TO GET BUCKEYE-MADE TRUCKS

Buckeye Steel Castings has been awarded an initial contract for approximately $2.5 million for GSI-designed trucks which will be used for commuter cars being built by General Electric for the Southeastern Pennsylvania Transportation Authority and the State of New Jersey. These will be the first railroad trucks to be furnished by Buckeye in the mass transit field as the result of a recently announced technical collaboration between Buckeye and General Steel Industries (RA, Aug. 27, p. 8).

NEW AMTRAK SERVICE SET FOR ILLINOIS

Illinois will get new Amtrak service linking Chicago with Rockford, East Dubuque, Bloomington, Springfield, Champaign, Urbana and Decatur. The new service, to be partly financed by the state, is made possible by the 1974 transportation bill passed by the legislature and signed by Governor Dan Walker recently. The bill includes a $1.5-million provision to help cover not less than two-thirds of the losses, as stipulated by the 1970 Federal act which created Amtrak. About $1 million of the appropriation will go for operating three new routes (Chicago-Rockford-East Dubuque; Chicago-Bloomington-Springfield; Chicago-Champaign-Urbana-Decatur), and continuation of one existing route (Chicago-Quincy). About $500,000 of the money will go for continuation of non-Amtrak routes over the Rock Island between Chicago-Peoria and Chicago-Quad Cities.

NYNJ PORT AUTHORITY SEEKS $147 MILLION

The Port Authority of New York and New Jersey is seeking a Federal capital grant of about $147 million to cover two-thirds of the cost of a new PATH rail transit service from Newark to Plainfield via Newark International Airport. PATH will file documentation this month about preliminary details of the project, estimated to cost $221,510,000. Local share for the project will be provided by the Port Authority and an advance from the state of New Jersey. Final application for the needed Federal capital funding is expected to be filed in March 1974.

ATLANTA GETS $69.5-MILLION UMTA GRANT

A $69.5-million grant to the Metropolitan Atlanta Rapid Transit Authority has been approved by the Urban Mass Transportation Administration. The grant, second largest ever made by UMTA, will help finance the first phase of Atlanta's $1.75-billion rail-busway rapid transit system. "We may make larger transit grants in the future," said Secretary of Transportation Claude S. Brinegar, "but we will never make one for a better purpose. The system the people of Atlanta are building has all the ingredients to make it a success." When completed, the project will consist of 50.1 miles of rapid rail transit and 14.4 miles of exclusive busways forming a single, coordinated rapid transit system serving Atlanta and DeKalb and Fulton counties. The local one-third share will come from a 1% sales tax.

NEW FROM VAPOR

there are speedometers and there is the Mk IV Vapor DIGITAL Speed Indicator

if you are among those who still think a speedometer is a speed indicator, look at the Mk IV

Shows only the exact speed, just like it is, the safe speed for your locomotives—
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The exact speed, at-a-glance in larger numerals, readable in direct sunlight.
The dependable speed, with solid state reliability. From 0 to 99 mph, with overspeed set to customer's requirement. Now complete in a single package that mounts anywhere. See for yourself—Put Mk IV digital speed indication in your locomotive cabs, and commuter cars.

See how—Write Vapor Corporation, Transportation Systems Division, 6420 West Howard Street, Chicago, Illinois 60648. In Canada—Vapor Canada Limited.

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TRANSPORTATION SYSTEMS DIVISION

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Viewpoint

Railroads and their suppliers

In the most recent peak-years for freight-car buying, 1965-66, railroad shops accounted for more than 25% of all orders. Over the first six months of 1973, when ordering has been close to the 1965-66 pace, railroad shops accounted for little more than 5% of the total.

Perhaps no other single set of current statistics could better illustrate the dependence of the railroad industry upon the railway supply industry—a continuing dependence, an increasing dependence, an across-the-board dependence which is certainly not confined to the freight-car market.

On the whole, this is a situation that need not be particularly worrisome—*provided* that railroads can continue to give (1) the incentives for old-line suppliers to stay in the business and for new suppliers to come in, and (2) the incentives for the supply industry to do the king of consistent research and product-development work without which tomorrow's railroads will find themselves falling behind tomorrow's other forms of transportation in terms of technology-based capability.

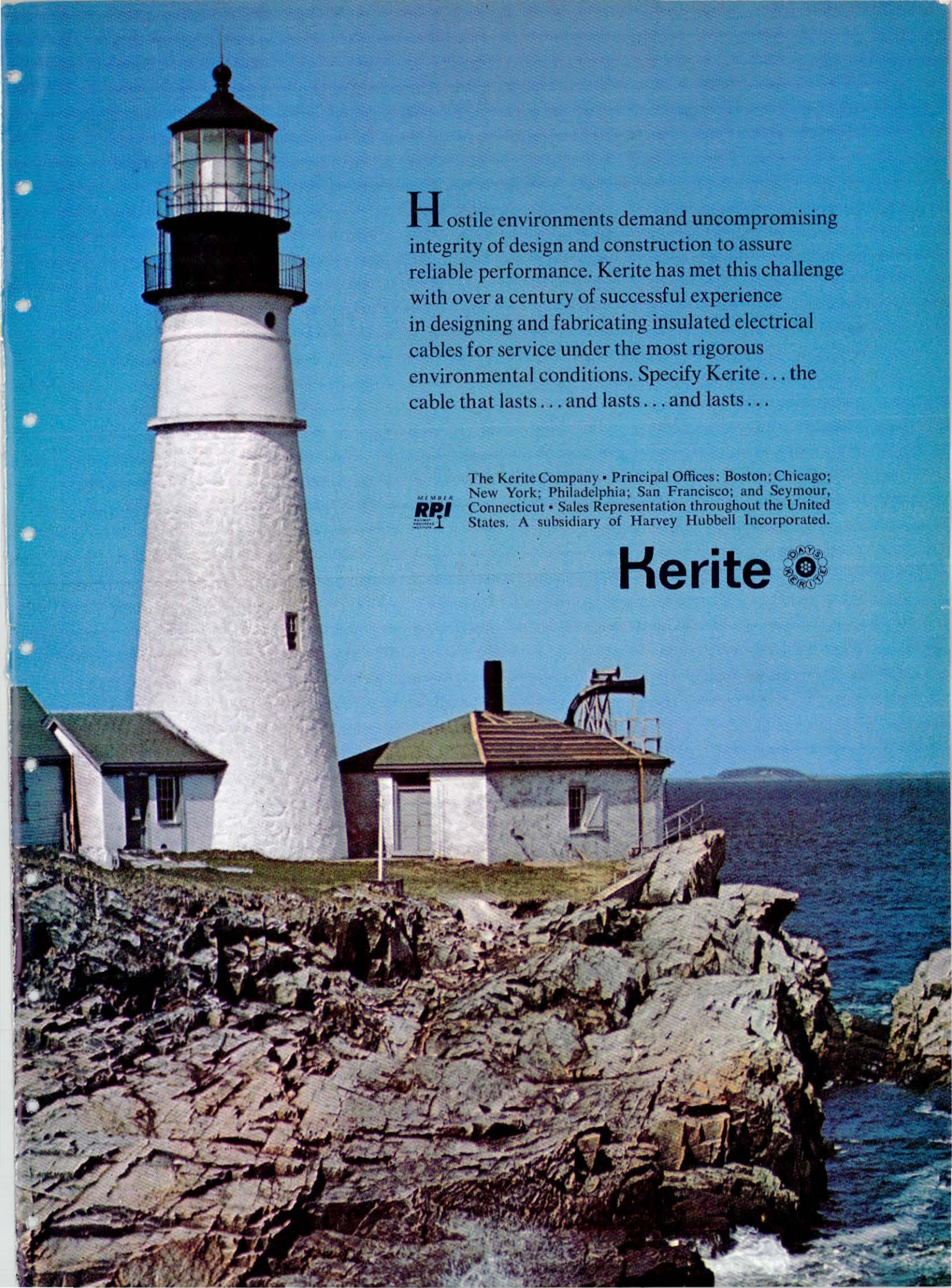
For the supply industry, recent years have been times of change, of a certain amount of shaking-down. Some companies have abandoned the field, or almost so. Some have diversified to the point where railroad business is no longer the make-or-break thing it used to be. Some—many, even—seem to be taking a revitalized approach to the railroad market. And there are a fair number of new guys in town, companies that see a good potential in the railroad and rail-transit fields, companies that want to grab off a piece of a realized potential.

ONE CANNOT PROSPER IF THE OTHER FALTERS

For the railroads—especially for the top people in the executive, operating, marketing, sales, mechanical, engineering and purchasing departments who ultimately make the big buying decisions—interesting things may be happening. Even though suppliers in some areas can boast of well-filled order books, competition may still in fact be intensifying. Product-quality is undoubtedly getting to be of utmost importance. Old "loyalties" may be fading. Buying decisions—choices from among competing products—may be being made in more hard-nosed fashion. And it is an unwary supplier who neglects (1) market research, (2) product development and product-quality control, and (3) product merchandising which uses all the merchandising tools available.

At this point, a fair number of economists are predicting a downturn in the economy generally by yearend or early '74. If they are right, what happens then can be significant—in terms of how well suppliers can hang in, and how well the railroads continue to back up that hanging-in. Forecasts for increased transportation demand—increased *railroad* transportation demand—being what they are, all concerned had better hope that the force of any recession can somehow be blunted and that railroads can continue to do what has to be done to insure the continuation of a healthy supply-and-support industry.

In final analysis, it comes down to this: If the suppliers get sick, railroads will not for long escape the virus.



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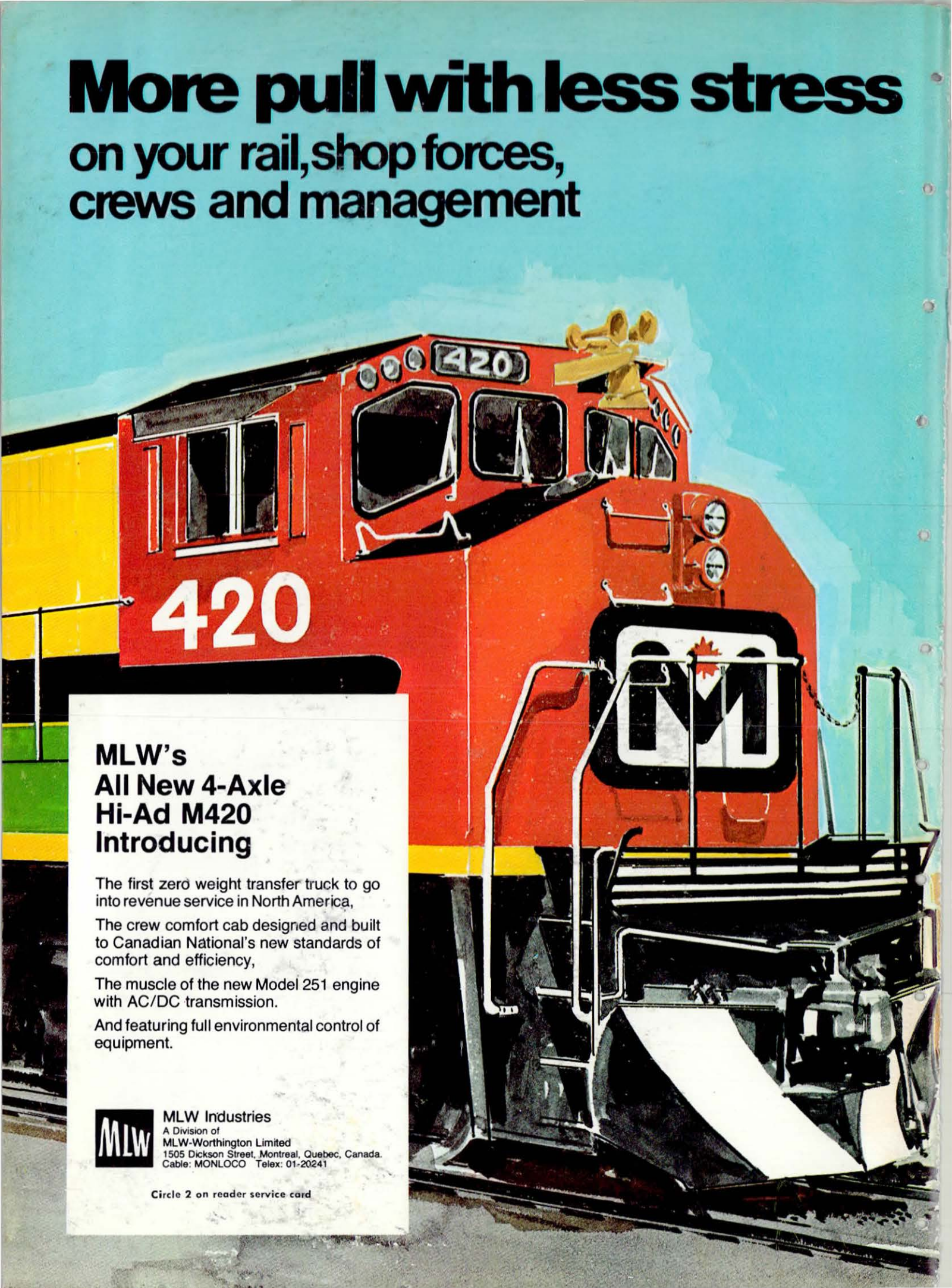

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